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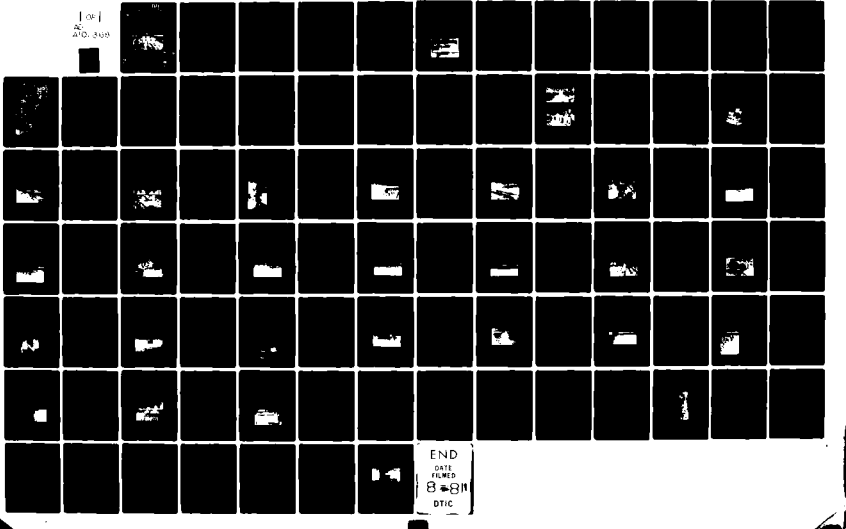

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HONEY CREEK WATERSHED PROJECT

TILLAGE DEMONSTRATION RESULTS 1980

PREPARED FOR THE
LAKE ERIE WASTEWATER
MANAGEMENT STUDY
U.S. ARMY ENGINEER DISTRICT, BUFFALO

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This publication reports results of 1980 tillage demonstration plots within the Honey Creek Watershed. Plot histories from planting to harvest, economic data and soil erosion information are reported. This publication is a compilation of data and information gathered while working with landowners to perform tillage demonstration practices.

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SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

HONEY CREEK WATERSHED PROJECT

TILLAGE DEMONSTRATION RESULTS 1980

Project Report for
Contract DACW-49-79-R-0037

by

HONEY CREEK JOINT BOARD OF SUPERVISORS
Crawford, Seneca and Huron Counties, Ohio

January 1981

Lake Erie Wastewater Management Study
U.S. Army Corps of Engineers
1776 Niagara Street
Buffalo, New York 14207

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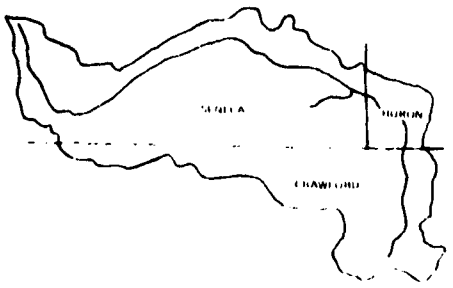

Honey Creek Watershed Management Project

COOPERATING AGENCIES

Soil Conservation Service | Soil & Water Conservation District

Cooperative Extension Service

Agriculture Stabilization and Conservation Service

155 E. Perry St.
Tiffin, Ohio 44883
January, 1981

Dear County Farmer:

Improving the quality of water draining from agricultural areas is a big job, but one which must be done. Done right, it does not need damage farm income. In fact, it may mean even more profit from your farm operation rather than less. Reduced tillage and no-till farming especially can improve water quality by reducing soil loss through erosion control. Soil retained in your fields means that expensive fertilizers, particularly phosphorus, and herbicides stay in place, too. Time and fuel savings help gain favorable returns from reduced tillage as well. Finally, taxpayer costs to clean ditches and dredge streams and lakes decrease. All of these factors, most of which benefit farmers directly, also improve water quality.

Through the Honey Creek Project, you, in cooperation with local agricultural agency people and farm service dealers, can work with us in determining ways to do our share of helping improve Lake Erie water quality. Together we should be able to demonstrate ways to do the water quality job--economically and practically.

This publication describes results of reduced tillage and no-till demonstration plots carried out within the Honey Creek watershed in 1980. These practices, when properly applied, not only reduce erosion, but also maintain or improve net farm income through economies of manpower, energy and machinery.

Please review the data presented. See how reduced tillage practices might fit into your farm operation. We feel that reduced tillage can directly benefit farmers while at the same time do the water quality job. What do you think? What is your your solution? The job must be done!

Sincerely yours,

Lee E. Buckingham

Lee Buckingham, Chairman
Honey Creek Joint Board of Supervisors

LB/JC/jk

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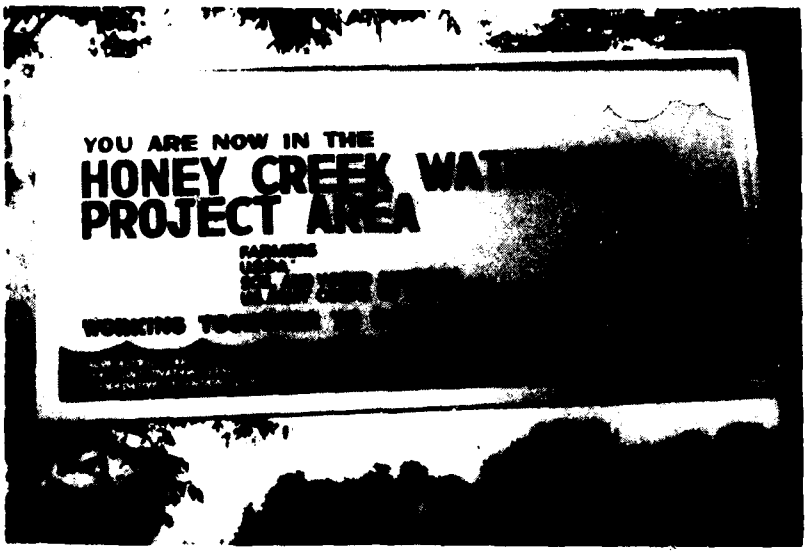

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Successful accomplishment of tillage demonstration plots this year resulted from the combined efforts of farmers, agri-business interests and agricultural agency people. Without the support of these people, there would have been no demonstration plots. Special thanks and appreciation to the following people for their part in the demonstration effort:

CRAWFORD COUNTY

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Roger Marquart	Niese Brothers	Tom Niese
Don Phenicie		Geissman Farms

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Bob Smith, Soil Conservation Service
Burton Geissman
Howard Von Stein
Milton Leonhart

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Gary Heibertshausen, Seneca Landmark, Tiffin, Ohio
Scott Romine, New Washington Equity, New Washington, Ohio
Dick Willman, Attica, Ohio

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INTRODUCTION

As a result of 1972 Federal legislation, Congress has given the U.S. Army Corps of Engineers responsibility for developing by 1982, a plan to "restore and repair" Lake Erie water quality. Since receiving this responsibility, the Army Corps has worked with other Federal agencies, Canadian officials, States, and numerous universities to develop a plan. Early work identified phosphorus as the element contributing to overenrichment of Lake waters. Plans were made to address significant "point" sources of phosphorus such as waste effluent from major cities. Reductions here, though, could not do the whole job. Treatment of diffuse or "nonpoint" phosphorus sources would be required if the Lake were to return to previous levels of water quality. Of these nonpoint sources, nutrient runoff from agricultural watersheds is most significent.

How, though, was the Corps, experienced as civil engineers, to address nutrient runoff and erosion control in farm areas? Their answer to this question was to ask the agricultural community for help. In November, 1978, this was done contractually through the Joint Board of Supervisors in the Honey Creek watershed.

The Honey Creek Watershed Management Program is a pilot demonstration project. Its purpose is to demonstrate on agricultural lands practices designed primarily for the purpose of improving water quality (Best Management Practices or BMP's). It is to also demonstrate approaches or ways to get practices on the ground. Finally, it is to inform people about agricultural activities - water quality relationships and how they can help develop workable ways to carry out erosion or nutrient control practices (BMP's).

With these goals in mind, the Joint Board, with help from Cooperative Extension Service, Soil Conservation Service, Agricultural Stabilization and Conservation Service and numerous farm service representatives, began working with farmers to carry out BMP's. Engineering practices such as grassed waterways and erosion control structures were planned as well as numerous plots demonstrating reduced tillage and no-till methods.

This publication reports results of 1980 tillage demonstration plots within the Honey Creek watershed. Plot histories from planting to harvest, including time and fuel estimates, economic data and computed soil loss estimates are reported. This publication is <u>not</u> a research document, rather a compilation of data and information gathered while working with landowners to perform tillage demonstration practices. Main efforts was "hands on" demonstrations that people could see and judge. Plot results, too, represent data from <u>one year only</u>. Consider this fact when comparing among plots or from plot data to your own experience.

RAINFALL AND TEMPERATURE - 1980

Cool and dry weather during the latter part of April and early May enabled early planting of all corn and some soybean plots. While cool, wet weather in mid May delayed soybean planting, all plots were completed by the last week of May.

On May 24th, two intense storms of nearly 3" each in the area around Tiro caused considerable damage to many conventionally planted corn and soybeans fields. Reduced tillage and no-till fields suffered little damage from either erosion or subsequent crusting. Minor damage did occur where flooding piled debris along field borders.

During the growing season (May-August), average rainfall for the watershed was 2.56" above normal, with July, +0.59", and August, +1.98", accounting for most of the rainfall excesses (Table 1). During these same two months, average temperatures were significantly warmer than normal: +2.76°F for July and +4.00°F for August (Table 2). These conditions combined on many days to produce tropical weather (temperatures above 90°F, relative humidity above 90%) across the watershed. As a result, opportunities for crop stresses existed at times throughout the growing season.

During fall, (September-October), average rainfall was 0.78" below normal, with October an exceptionally dry month, -0.68". While temperatures were above normal for September, +1.88°F, they were well below normal for October, -4.95°F. This cool dry period following the warm months of July and August, produced ideal fall harvest conditions. Crops matured early and fields were firm and dry throughout harvest, resulting in the completion of most harvest operations by the end of October.

Table 1. Precipitation summary (rainfall, inches) by location, west to east, across the Honey Creek watershed, 1980.

LOCATION	May	June	July	August	Sept.	Oct.	TOTAL
Tiffin	3.45"	3.63"	3.38"	5.52"	2.54"	1.41"	19.93"
Eden Township	5.23	3.85	4.30	5.26	3.35	1.80	23.79
Bloom Township	3.13	3.49	4.16	6.23	2.66	1.65	21.32
Venice Township	3.67	4.24	5.27	5.23	2.72	1.60	22.73
Plymouth	3.42	4.66	4.21	3.10	1.98	1.55	18.92
Average	3.78"	3.97"	4.26"	5.07"	2.65"	1.60"	21.34"
Deviation*	(+.28)	(-.29)	(+.59)	(+1.98)	(-.10)	(-.68)	(+1.79)

Table 2. Temperature summary (degrees Fahrenheit) for Tiffin, Ohio, 1980

TIFFIN	May	June	July	August	Sept.	Oct.
1980	61.90°	67.38°	75.56°	75.70°	67.08°	49.65°
Deviation*	(+1.20)	(-2.52)	(+2.76)	(+4.00)	(+1.88)	(-4.95)

*Deviations calculated using 30-year Environmental Science Services Administration averages for the station of Tiffin, Ohio.

PERFORMING DEMONSTRATION PLOTS

Plot Selection

During this second year of the project, plot selection was a more timely and orderly process. Tentative plot selection began in midsummer, 1979, to enable proper planning of cover crops, fall fertilization and tillage operations. Plots selected were based on county task force recommendations to demonstrate: (1) conventional tillage practices (plow systems) beside reduced and no-tillage practices, (2) several types of reduced or no-tillage side by side, (3) second year no-till after first year no-till and (4) the planting of both corn and soybeans in a variety of crop residue situations. Potential locations for plots came from suggestions by first year cooperators and task force members, plus contacts made with landowners during tours or workshops held within the watershed.

Factors influencing final location were soil suitability for reduced tillage or no-till, drainage, known problem erosion areas and field histories (weed pressure, insect problems, fertility). Demonstration plots were also to be adjacent to roads and accessible for public viewing. Using these recommendations and guidelines, landowners were contacted during late summer and fall to determine fields suitable for tillage demonstrations. Subsequent field checks of these locations by project staff and Extension Service personnel led to final plot selection. See map, page 5.

All but three plots fell within areas identified for priority erosion control treatment, those same areas where, because of drainage and topography, chances for crop successes with reduced tillage and no-till would be greatest. As a result, plots generally reflect conditions within the watershed where reduced tillage and no-till would work well, both from the standpoint of crop yields and erosion reduction.

Planning

Where necessary, planning for cover crops, fall tillage or fall fertilization was done prior to final plot selection. After fall soil tests were returned by the Research-Extension Analytical Laboratory, O.A.R.D.C., Wooster, Ohio, and final plot selection, the landowners were contacted in December to plan demonstration plot details. Recommendations were made regarding fertility, herbicide-insecticide usage, seed varieties and equipment to be used. (Two planters, a Buffalo slot planter and a John Deere 7000 conservation planter, were leased by the Joint Board and made available to cooperators requiring them.) It was further determined that the farmer would have herbicides custom applied following planting. If necessary, times were also set to assist landowners in planter calibration. Finally, all cooperators were asked to contact project personnel before planting so that one of them or an agency representative could be present to view planting and/or assist the planting operation. Thru all planning discussion, management steps required to insure a successful reduced tillage operation were emphasized. Extension Service representatives reviewed final recommendations to insure technical correctness. Extension personnel, farm service dealers/representatives and others with current information on reduced tillage also provided assistance during final plot planning.

Planting - Spraying

In checking the plots or upon notification from a cooperator that he was ready to plant, project or other agency personnel/staff went to the plot to assist

planting and to check seeding rates, depths and insecticides. In some cases project personnel drove planting equipment so farmers could observe proper operation of planting units. Most plots were custom sprayed after planting. To help insure proper herbicide application, local custom applicators, where possible, were informed about the plots and provided written herbicide recommendations several weeks before planting. Day to day contact with custom applicators by project staff and cooperators led to the assurance of plots getting sprayed on time with the proper herbicides and rates. Again, this year proves that custom applicators can do a very good job at spraying in reduced tillage and no-till systems.

Monitoring

Following planting, plots were checked for emergent plant populations. Amount of past crop residues on the surface was also estimated. Throughout the growing season, insect, weed and disease conditions were checked two to three times weekly by either project staff or Extension Service representatives. Where pest problems were detected, recommendations were made to eliminate or reduce damage encountered. Near the end of the growing season, final stand populations were recorded. Photo documentation of most plots was also done.

Harvest

In order to uniformly determine net return to farmers from corn plots, yield checks were done using the method employed by Chevron Chemical Company in their state-wide (Ohio) no-till yield contest. With this method, a representative acre or more is harvested. Based on average row width, length, number of rows, corn moisture at harvest, and total weight harvested, corn yields were calculated to 15.5% moisture. Total harvest weights from demonstration plots were determined with a weigh wagon having an electronic scale with digital readout. For soybeans the method was modified to include measurements of combine header width as compared to row width for corn. Modifications were also made to calculate bean yields at 13% moisture.

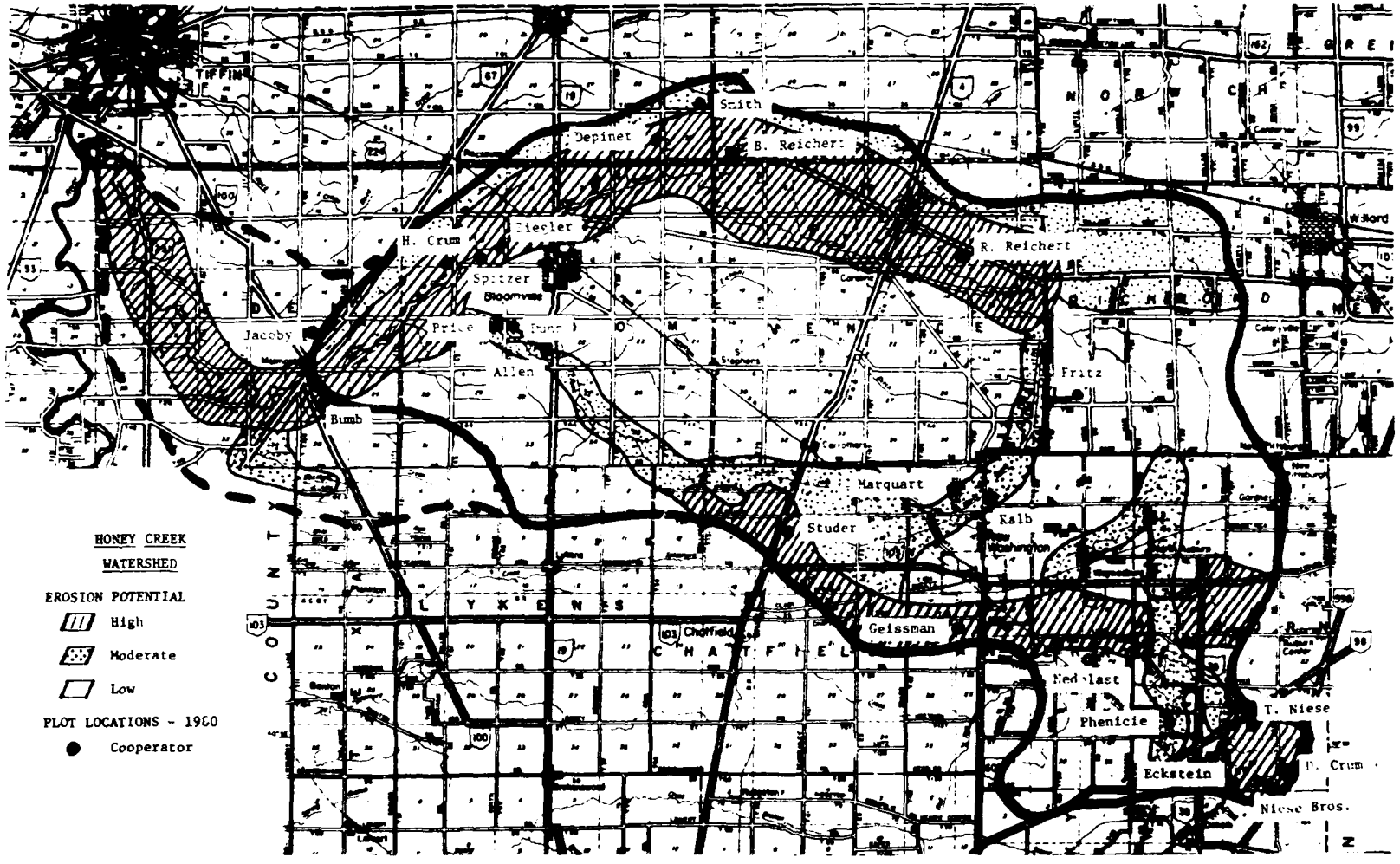

HONEY CREEK
WATERSHED
EROSION POTENTIAL
High
Moderate
Low
PLOT LOCATIONS - 1960
Cooperator
TIFFIN
Smith
Depinet
B. Reicher
H. Crum
Diecler
R. Reichert
Spitzer
Bloomville
Jacoby
Price
Allen
Fritz
Bumb
Marquart
Studer
Kalb
Washington
SENECA
CHATFIELD
Geissman
Ned Mast
Phenicie
T. Niese
Eckstein
Niese Bros.

TABLE 4 SOIL FERTILITY IN DEMONSTRATION PLOTS

Cooperator	Phenicie	Phenicie	Nedolast	Price	Depinet
Soil type /1	Cardington SiLo	Bennington SiLo	Lenawee SiClLo	Tiro SiLo	Blount SiLo
pH /2	5.1	6.5	6.7	6.3	7.0
Lime test index /3	62	67	68	67	70
Phosphorus(P)lb/ac /4	37	33	18	35	20
Potassium(K)lb/ac /5	315	250	326	229	231
Calcium(Ca)lb/ac /6	2080	3210	3820	2820	4300
Magnesium(Mg)lb/ac /7	372	441	1264	516	698
C.E.C. /8	17	14	25	13	14
Organic matter (%)	2.1	1.9	4.0	2.2	2.2
Base saturation %CA %Mg %K /9	31 9 2.4	58 13 2.3	68 21 1.7	54 16 2.2	77 21 2.1

Cooperator	Bumb	B.Reichert	Niese Bro.	Marquart	Dunn
Soil type	Gallman Lo	Blount SiLo	Cardington SiLo	Tiro SiLo	Tiro SiLo
PH	6.1	7.1	7.0	6.5	5.5
Lime test index	67	70	70	69	63
Phosphorus(P)lb/ac	78	21	57	43	96
Potassium(K)lb/ac	238	205	260	221	249
Calcium(Ca)lb/ac	3170	4440	3160	3490	2170
Magnesium(Mg)lb/ac	473	651	331	607	281
C.E.C.	14	14	10	13	15
Organic matter (%)	2.8	2.1	2.0	2.8	2.2
Base saturation %Ca %Mg %K	57 14 2.2	79 19 1.9	82 14 3.5	68 20 2.2	35 8 2.1

Cooperator	T. Niese
Soil type	Bennington SiLo
pH	6.5
Lime test index	67
Phosphorus(P)lb/ac	34
Potassium(K)lb/ac	268
Calcium(Ca)lb/ac	4380
Magnesium(Mg)lb/ac	608
C.E.C.	17
Organic matter (%)	2.7
Base saturation %Ca %Mg %K	63 15 2.0

TABLE 4 gives the soil test values as determined by The Ohio State University Laboratory for all 1980 Honey Creek demonstration plots. Soil test samples were taken in the fall after previous crop harvest. Annual recommendations from the laboratory, previous and expected crop yields, and present fertility buildup programs were used to determine the amount of nutrients to be applied.

/1 Predominent soil type of 5-15 acre plots: Si = silt, Cl = clay, Lo = loam. All soil tests were taken 8-9" deep.

TABLE 4 SOIL FERTILITY IN DEMONSTRATION PLOTS (CONTINUED)

Ziegler	D. Crum	Kalb	Fritz	Geissman	Allen	R.Reichert
Tiro SiLo	Cardington SiLo	Bennington SiLo	Bennington SiLo	Tiro SiLo	Tiro SiLo	Blount SiLo
6.2	5.4	7.1	6.9	7.1	6.6	7.0
68	64	70	69	70	69	70
58	35	24	135+	20	22	61
216	223	230	319	223	203	246
2660	2230	3740	3670	3940	3040	3250
344	332	622	559	555	680	528
11	14	12	13	12	12	11
2.0	1.9	2.6	2.9	2.4	2.0	2.0
62 13 2.6	39 10 2.1	76 21 2.4	70 18 3.1	79 19 2.3	64 24 2.2	76 21 3.0

Jacoby	H. Crum	Eckstein	D. Crum	Smith	Studer	Spitzer
Blount SiLo	Blount SiLo	Bennington SiLo	Bennington SiLo	Blount SiLo	Bennington SiLo	Gallman SiLo
6.2	6.6	6.1	5.9	7.0	6.6	6.4
67	68	67	64	69	68	67
17	26	14	41	50	58	74
266	210	154	254	287	263	189
3330	3810	3060	3750	4440	3370	3120
696	577	514	531	630	536	549
15	15	14	19	15	13	14
2.3	2.6	2.2	2.8	3.0	2.6	2.8
55 19 2.2	65 16 1.8	56 16 1.5	49 12 1.7	73 17 2.4	63 17 2.5	56 16 1.7

/2 Soil pH test measures active soil acidity. Recommended range for corn and soybeans is 6.0 to 7.0.

/3 Used to determine lime requirement. The lower the lime test index is below 68, the higher the lime requirement.

/4 Recommended range for phosphorus (Bray P1) is 40#/acre for corn and soybeans.

/5 Recommended range for potash is 250-420 lb/ac depending on C.E.C. and crop.

/6 If soil pH is maintained at adequate levels, calcium deficiencies seldom occur.

/7 The pounds per acre of magnesium should be at least two times the soil test (K) potassium levels and at least 8% of base saturation.

/8 C.E.C. = cation exchange capacity.

/9 Base saturation is the percentage of C.E.C. occupied by calcium, magnesium and potassium.

Tillage Plot Economics - Guidelines for Comparison

During 1980 tillage demonstrations, cooperators reported quantities of fertilizer, herbicides and insecticides used per acre, and noted the number and type of operations across their plots. Tables 7 and 8 show 1980 spring no-till unit prices of materials and machine custom rate charges used in determining production costs. Estimated fuel usage and time for tillage are also given. The $3.00 base price for corn was determined by checking local elevators during the busiest week at harvest time and averaging the current market price at that time. The $7.50 base price for soybeans was determined in the same manner. Crop value for corn was calculated by taking yields at 15.5% moisture, multiplying by the base price ($3.00), minus the wet bushels produced per acre times the drying charges (local elevator schedule). Crop value for soybeans was calculated by taking yields at 13.0% moisture, multiplying by the base price ($7.50), minus wet bushels produced per acre times the drying charges (local elevator schedule). Return to land and management was then calculated as the difference between crop value and production costs. Pages 16 to 25 provide detailed explanation and breakdown of calculations for all tillage plots.

Guidelines

1. In 1980 there was a greater emphasis to compare different tillage systems with one another. There were 27 no-till plots, 7 reduced tillage, and 13 conventional plots in corn, while there were 8 no-till soybeans plots, 1 reduced tillage, and 5 conventional plots in soybeans. There were more no-till plots with corn and soybeans in order to put emphasis in certain areas on the conservation practice itself rather than comparisons with other tillage systems. We hope individual plot details sheets are read before conclusions are made from looking at total plot averages. This year's work shows a bright future for conservation tillage in this area. What has been learned this year has given us a head start for better production with conservation tillage in the future.

2. Land costs are omitted. These costs include interest, depreciation on land improvements, and property taxes. While important costs, they are the same regardless of the tillage method used or the crop grown, thus they are omitted from the analysis.

3. Material costs for corn and soybeans plots varied both within and among tillage categories (no-till, reduced till, and conventional). Variations are attributed to yield goals, buildup of residual fertility, previous crops, and amounts of growing vegetation present at planting time (reduced till and no-till plots). As noted in the individual economic analyses, growing vegetation within some reduced or no-till plots requires additional expense for a contact herbicide ($5-$11/A) and surfactant ($.20-$1.20/A). Rates of residual herbicides were about the same except slightly higher rates were generally used to insure control under heavy residue conditions. In summary, material costs were somewhat higher in no-till and reduced till plots because of the addition of a contact herbicide and added insecticides for armyworm control. No-till corn was $19.17 higher than conventional, and reduced till corn had $14.05 more material cost than the conventional corn plots. Soybean tillage plots had similar relationships. Pest management is a very useful tool to eliminating costly preventive measures for possible insect infestations.

4. Machine costs for plots within a given tillage category were fairly consistent (Tables 7 and 8). Conventional corn tillage plots had $21.26 more machine cost than no-till corn plots, and reduced till corn plots had $8.63 more machine cost than the no-till plots. Because of the added cost for tillage,

conventional plots had $2.09 more total cost than no-till. The difference between reduced tillage machine costs and conventional tillage was $1.42. In the soybean tillage plots, similar relationships with machine costs could be seen.

5. Savings in machine costs were more than enough to eliminate any extra cost of materials needed in the reduced or no-till corn and soybean plots.

6. No costs were given for the establishment of rye or other cover crops which would be necessary in a corn-soybean rotation on steep slopes where soybean residue isn't enough to hold back sheet and rill erosion. This cost would average $6-$12 for seed and $3-$6 for tillage, aerial application and/or other mechanical seeding of the cover crop.

7. Nitrogen costs vary according to form in which N is applied.

8. The schedule of costom rates may differ from those in your area. The costs of owning and operating your own equipment may differ somewhat. Machine custom rates include overhead costs, machine operating costs, machine replacement, repairs, fuel, and time for the operator.

9. Timeliness of operation is not considered in any of the economic comparisons. Reduced tillage systems and no-till as shown in Tables 7 and 8 may enhance the timeliness of field operations. Research has shown corn yields are reduced one bushel per acre per day planting occurs after May 10th. As a general rule, soybean yields will be reduced 1/3 to 1/2 bushel per acre per day planting is delayed after the 10th of May. Thus, reduced and no-till systems with their lower field time requirements may improve the timeliness and increase yields for your operations.

10. Cost of insecticides were about the same for no-till, reduced and conventional tillage. Most corn plots received seed treater and all corn plots planted to second-year corn received rootworm control materials. Increased use of insecticides came from the use of preventive armyworm insecticide (Furadan) which did not hold down infestation of armyworms in the rye cover crops. This led to an extra trip across the field when economic thresholds were reached, with an application of Toxaphene to control the armyworms.

11. Cost for soil loss is not included but needs important consideration. Soil loss may be a significant economic loss in your farm operation particularly as it affects future productivity. Also this soil loss may impose costs on others as sediment is deposited in drainage ditches, streams and harbors.

12. Fuel and time consumed in tillage were not actually measured in the plots but adopted from Ohio State University Bulletin "Selecting a Tillage System" by J. E. Beuerlein and S. W. Bone, Extension Agronomists, Ohio State University.

13. Yields will still be a main factor in determining profitability of different conservation tillage systems. Some yield may be sacrificed if it is covered by decreased costs in putting out the crop and/or if some value is put on possible soil loss. With any tillage system, experience and years of practice with different growing seasons will enable more reliable comparison of results and conclusions on your farm.

TABLE 5 UNIT PRICES OF MATERIALS

Fertilizer:

Anhydrous ammonia	(82%)	$263/ton or	16¢/lb. actual N
Nitrogen solution	(28%)	$135/ton or	24¢/lb. actual N
Ammonium nitrate	(33%)	$175/ton or	26.5¢/lb. actual N
Urea	(45%)	$230/ton or	25.5¢/lb. actual N
0-46-0		$247/ton or	28¢/lb. actual P
0-0-60		$138/ton or	11.5¢/lb. actual K
18-46-0		$295/ton	
6-24-24		$206/ton	
12-24-24		$223/ton	
9-27-3+2s		$244/ton	
9-27-3		$242/ton	
10-34-0		$290/ton	
9-29-19		$260/ton	
11-33-11+2s		$240/ton	
14-21-9+1z+10s		$230/ton	
8-32-16		$240/ton	
3-9-27		$148/ton	
11-40-11+1s		$293/ton	
5-14-42		$185/ton	
7-20-34		$215/ton	
7-20-34+20 mn		$307/ton	
0-14-42		$173/ton	
6-15-40		$190/ton	
9-18-9		$3.20/gal.	
/1 Seed, lime, misc. . . .		$40/acre	

NOTE: Your price will vary according to season, financing, location, and discounts.

/1 Includes supplies, utilities, soil tests, small tools, crop insurance, etc.

Herbicides:

Roundup	$65.50/gal.	Sutan+ 6.7E	$19.80/gal.
Paraquat CL	43.00/gal.	Lasso 4E	16.50/gal.
X-77 Spreader	13.00/gal.	Dual 8E	40.00/gal.
Atrazine 80W	1.90/lb.	Lexone/Sencor 4L	75.00/gal.
Atrazine 4L	9.50/gal.	Lorox 50W	4.80/lb.
Princep 80W	3.20/lb.	2,4-D Amine	11.00/gal.
Princep 4L	17.50/gal.	Banvel D	36.50/gal.
Bladex 80W	2.80/lb.		
Bladex 4L	15.75/gal.		

Insecticides:

Isotox seed treater "D" and "F"	$ .65/acre
Dyfonate 4E	27.60/gal.
Furadan 10G	.78/lb.
Toxaphene 6E	9.20/gal.

TABLE 6 MACHINE CUSTOM RATES

OPERATION	IMPLEMENT	CUSTOM RATE	DIESEL FUEL /1 FOR TILLAGE: GALLONS/ACRE	TIME /1 FOR TILLAGE MINUTES/ACRE
Primary tillage	Moldboard plow	$11.00/acre	1.85	19
	Coultered chisel	8.25	1.35	15
	Chisel plow	8.25	1.15	15
	Offset disc	8.25	1.15	15
Secondary tillage	Field cultivator	6.00	.65	8
	Tandem disc	5.50	.65	8
	Harrogator/packer	5.00	.45	6
	Cultimulcher	4.50	.40	6
Planting or drilling	No-till	11.00	.75	15
/2	Conventional	8.00	.65	10
Apply anhydrous ammonia		6.00	.65	6
Rotary hoeing		2.50	.25	6
Cultivate row crops		4.50	.39	11
Spray liquids		3.00		
Spread dry fertilizer		3.00		
Aerial application		4.00		
Harvest corn		19.50		
Harvest soybeans		17.50		
Truck grain (300+ bu. loads)(10+ miles)		.09/bu.		

/1 Based on 100 HP tractor, 6-30" planter and cultivator, and 14' wide tillage equipment

/2 If no-till planter was used in a plot where a conventional planter would have worked, the conventional rate was used. In doubling back to get narrower rows for soybeans, $16.50 was used for no-till and $12.00 for conventional. Time and diesel fuel were doubled in those cases.

TABLE 7 ECONOMIC SUMMARY (CORN)

NO-TILL

Cooperator	Phenicie	Phenicie	Phenicie	Nedolast	Nedolast	Nedolast	Price
Material Costs	$209.05	$209.05	$209.05	$163.33	$163.33	$163.33	$242.07
Machine Costs	47.47	47.47	47.02	53.90	53.12	55.42	54.54
Total Costs	$256.52	$256.52	$256.07	$217.23	$216.45	$218.75	$296.61
Return (net)	$ 53.34	$ 91.91	$ 77.96	$ 80.36	$ 73.23	$149.90	$141.37
Yield Bu/A	111.3	118.6	113.7	106.3	100.9	129.9	155.1
Time for tillage	15	15	15	21	21	21	15
Diesel fuel used	.75	.75	.75	1.40	1.40	1.40	.75

Cooperator	Geissman	Geissman	Allen	Allen	RReichert	Bumb	BReichert
Material Costs	$209.56	$204.64	$201.62	$201.62	$213.83	$186.84	$233.51
Machine Costs	50.11	47.82	48.36	48.05	55.21	49.41	59.12
Total Costs	$259.67	$252.46	$249.98	$249.67	$269.04	$236.25	$292.63
Return (net)	$ 44.78	$ 77.38	$ 16.72	$ -3.40	$ 91.28	$143.94	$ 77.69
Yield Bu/A	109.6	116.8	92.9	87.6	129.3	133.9	130.6
Time for tillage	15	15	15	15	15	15	15
Diesel fuel used	.75	.75	.75	.75	.75	.75	.75

REDUCED TILL

Cooperator	Phenicie	Phenicie	Depinet	Ziegler	Kalb	Geissman	NieseBro.
Material Costs	$209.05	$202.17	$190.53	$162.30	$176.05	$194.85	$232.02
Machine Costs	51.37	58.38	61.83	64.34	61.19	57.42	62.83
Total Costs	$260.42	$260.55	$252.36	$226.64	$237.24	$252.27	$294.86
Return (net)	$ 35.53	$ 83.70	$ 18.60	$191.01	$ 67.80	$ 95.40	$ 67.53
Yield Bu/A	101.1	118.5	98.6	146.7	109.0	123.1	128.9
Time for tillage	23	33	32	38	32	26	33
Diesel fuel used	1.40	2.45	2.44	2.55	2.60	1.95	2.65

CONVENTIONAL

Cooperator	Phenicie	Nedolast	Nedolast	Ziegler	Fritz	Geissman	Allen
Material Costs	$202.17	$145.13	$145.13	$162.30	$164.71	$194.85	$190.03
Machine Costs	64.49	80.36	79.71	65.28	68.66	68.32	75.75
Total Costs	$266.66	$225.49	$224.84	$227.58	$233.37	$263.17	$265.78
Return (net)	$ 85.71	$153.10	$152.52	$217.78	$134.51	$ 74.67	$ 55.02
Yield Bu/A	119.5	133.5	129.9	157.7	130.3	120.7	112.2
Time for tillage	41	60	60	37	45	45	51
Diesel fuel used	3.30	4.64	4.64	3.15	3.80	3.80	4.20

NOTE: Summary of production costs and yields are taken from pages 16 to 65. See individual, economic analysis pages for detailed explanation of cost differences. Material Costs include seed, lime, miscellaneous, fertilizer, herbicides, and interest on operating capital. Machine Costs include custom rates for tillage, planting, harvesting, trucking, application of fertilizers, herbicides and insecticides.

TABLE 7 ECONOMIC SUMMARY (CORN) (CONTINUED)

NO-TILL

Depinet	Ziegler	D. Crum	Kalb	Kalb	Fritz	Fritz	Fritz	
$199.57	$167.89	$208.92	$193.17	$188.24	$193.70	$193.70	$193.70	
46.53	50.92	48.12	57.62	53.35	47.37	49.31	49.92	
$246.10	$218.81	$257.04	$250.79	$241.59	$241.07	$243.01	$243.62	
$ 35.45	$200.47	$ 51.71	$ 99.71	$ 65.77	$ -9.94	$ 50.11	$ 87.50	
101.5	148.5	114.6	124.5	110.3	81.5	102.5	112.7	
15	15	15	21	21	15	15	15	
.75	.75	.75	1.4	1.4	.75	.75	.75	

NO-TILL

NieseBr.	Marquart	Dunn	Jacoby	H. Crum		Average
$244.06	$215.79	$215.02	$193.16	$193.05	. . . . .	$200.40
55.20	48.80	53.19	49.79	49.76	. . . . .	50.99
$299.26	$264.59	$268.21	$242.95	$242.81	. . . . .	$251.39
$ 73.03	$ 87.01	$143.75	$ 81.69	$179.77	. . . . .	$ 83.79
131.3	125.4	143.5	110.9	143.7	. . . . .	118.05
15	15	15	15	15	. . . . .	16.11
.75	.75	.75	.75	.75	. . . . .	.87

REDUCED TILL

REDUCED TILL

	Average
. . . . .	$195.28
. . . . .	59.62
. . . . .	$254.90
. . . . .	$ 79.94
. . . . .	117.98
. . . . .	31.00
. . . . .	2.29

CONVENTIONAL

CONVENTIONAL

RReichert	Bumb	B Reichert	Marquart	Dunn	Jacoby		Average
$192.18	$169.17	$214.71	$196.92	$202.80	$175.94	. . . . .	$181.23
67.67	63.74	75.60	78.36	78.83	72.45	. . . . .	72.25
$259.85	$232.91	$290.31	$275.28	$281.63	$248.39	. . . . .	$253.48
$ 82.20	$168.37	$ 75.88	$151.48	$223.88	$165.15	. . . . .	$133.86
123.3	141.9	129.7	149.7	174.0	140.5	. . . . .	135.60
45	37	43	56	54	45	. . . . .	47.62
3.8	3.15	3.6	4.19	3.99	3.8	. . . . .	3.85

Spring and summer tours were part of the activities going on after demonstration plots are planted. Cooperators Carl Ziegler (top) and Jim Spitzer (bottom) talk to tour goers about their experiences this year with conservation tillage.

Table 8, ECONOMIC SUMMARY (SOYBEANS)

NO-TILL

Cooperator	Eckstein	D. Crum	Smith	Smith
Material Costs	$119.94	$111.35	$109.41	$109.41
Machine Costs	44.10	39.31	45.04	44.80
Total Costs	$164.04	$150.66	$154.45	$154.21
Return (net)	$178.16	$249.84	$247.37	$245.54
Yield Bu/A	45.6	53.6	53.7	53.3
Time for tillage	30	30	30	30
Diesel fuel used	1.5	1.5	1.5	1.5

NO-TILL

Cooperator	Studer	Spitzer	T. Niese	T. Niese	Average
Material Costs	$ 70.48	$ 75.97	$136.60 /1	$113.53	$105.84
Machine Costs	41.01	41.93	44.96	41.71	42.86
Total Costs	$111.49	$117.90	$181.56	$155.24	$148.70
Return (net)	$223.01	$290.86	$189.19	$194.81	$227.35
Yield Bu/A	44.6	54.8	49.5	46.8	50.24
Time for tillage	30	30	15	15	26.25
Diesel fuel used	1.5	1.5	.75	.75	1.31

REDUCED TILL

Cooperator	Studer	Average
Material Costs	$ 63.18	$ 63.18
Machine Costs	55.17	55.17
Total Costs	$118.35	$118.35
Return (net)	$187.65	$187.65
Yield Bu/A	40.78	40.78
Time for tillage	50	50
Diesel fuel used	3.5	3.5

REDUCED TILL

CONVENTIONAL

Cooperator	Eckstein	Smith	Studer	Spitzer	Spitzer	Average
Material Costs	$108.15	$ 99.86	$ 63.18	$ 60.63	$ 60.63	$ 78.49
Machine Costs	67.87	61.38	61.27	59.19	54.99	60.94
Total Costs	$176.02	$161.24	$124.45	$119.82	$115.62	$139.43
Return (net)	$188.48	$161.14	$231.05	$268.80	$256.58	$221.21
Yield Bu/A	48.6	43.1	47.1	52.1	49.9	48.22
Time for tillage	61	55	61	55	45	55.4
Diesel fuel used	4.9	4.45	4.7	4.45	3.8	4.46

CONVENTIONAL

/1 Roundup used for quackgrass eradication.

NOTE: Summary of production costs and yields are taken from pages 16 to 25. See individual economic analysis pages for detailed explanation of cost differences. Material Costs include seed, lime, miscellaneous, fertilizer, herbicides and interest on operation capital. Machinery Costs include custom rates for tillage, planting, harvesting, trucking and application of fertilizers, herbicides and insecticides.

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

Don Phenicie, 5661 Stevens Road, New Washington, Ohio 44854 C1

PLOT NO.	TILLAGE	CROP	FINAL STAND	MOISTURE	TEST WEIGHT	YIELD DRY/BU/AC	TOTAL VALUE	TOTAL COSTS	RETURN TO LAND, MGT.
1	No-till	Corn /1	22,312	25.0	53.6	111.3	$309.86	$256.52	$ 53.34

TILLAGE

1 Planted with Allis Chalmers 333 no-till air planter

PLOT NO.	1
Tillage treatment	No-till
TOTAL VALUE	$309.86
Seed, lime, misc.	$ 40.00
Fertilizer:	
Broadcast: (170# 0-44-0 $20.99 (400# 0-0-60 27.60	48.59
Starter: 200# 14-21-9+1z+10s	23.00
Nitrogen applied as 28-0-0	46.32
Chemicals:	
Herbicides	26.94
Insecticides	10.53
Interest: 7 months @ 12%	13.67
TOTAL VARIABLE COSTS	$209.05
Machinery (custom rates)	
Primary tillage	$ -
Secondary tillage	-
Planting	11.00
Cultivation	-
Spraying, spread fertilizer	6.00
Apply ammonia	-
Harvest	19.50
Trucking	10.97
TOTAL MACHINERY COSTS	$ 47.47
TOTAL COSTS	$256.52
RETURN TO LAND, MANAGEMENT	$ 53.34

Time for tillage (minutes, estimated) 15
Diesel fuel for tillage (gallons, estimated) .75

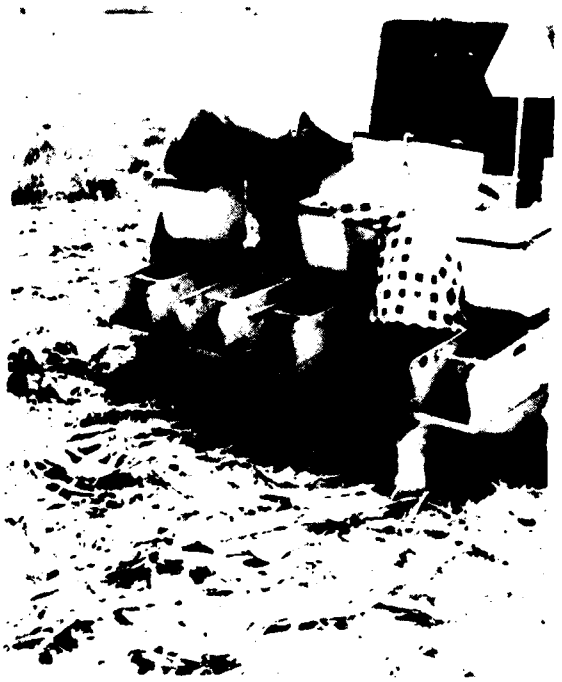
/1 Stated is the average final stand, moisture, test weight, and yield in dry/bu/ac for 8 different varieties.

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

Don Phenicie, 5661 Stevens Road, New Washington, Ohio 44854 C1

PLOT DETAILS

Planted 8 different corn hybrids (Select Seeds 3300, Pioneer 3535, Funks 4141A, Landmark 747X, Pioneer 3518, Pioneer 3541, Funks 4323, Pioneer 3780) on April 30 in 30-inch rows. Intended seed drop was 31,000 of which emergence varied from 25,000 to 29,750 plants for an average plant emergence of 27,462 (88.6%). Soils present are Bennington and Cardington silt loams. Tile drainage is systematic. 1979 crop was no-till corn. Lime at 4 tons per acre was broadcasted in the fall after previous crop was harvested as part of his normal liming program. 170# 0-44-0 and 400# 0-0-60 was also broadcasted in the fall. 200# 14-21-9+1z+10s was applied next to the row. 193# N was applied as 28% for a total N-P_2O_5-K_2O as follows: 221-117-258. 1 pt. Paraquat CL with 16 oz. X-77 spreader per 100 gallons 28%, 2½# Princep 80W and 2½ pt. Dual 8E were applied just after planting using 65 gallons/acre 28% as carrier. Good grass and excellent broadleaf weed control, some giant foxtail and fall panicum. 13.5# Furadan 10G applied in the furrow. No insect problems. Harvested October 9.



Proper planter calibration and adjustment are important anytime, but even more so when operating new planters under a variety of surface roughness or residue conditions.

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

Don Phenicie, 5661 Stevens Road, New Washington, Ohio 44854 C2

PLOT NO.	TILLAGE	CROP	FINAL STAND	MOIS-TURE	TEST WEIGHT	YIELD DRY/BU/AC	TOTAL VALUE	TOTAL COSTS	RETURN TO LAND, MGT.
1	No-till (rye)/1	Corn	23,900	18.4	55.0	118.6	$348.43	$256.52	$ 91.91
2	Fall plow	Corn	22,150	17.6	55.0	119.5	352.37	266.66	85.71
3	No-till	Corn	23,100	18.4	54.5	113.7	334.03	256.07	77.96
4	Fall disc	Corn	24,100	18.65	55.0	101.1	295.95	260.42	35.53
5	Fall chisel	Corn	23,300	19.9	54.5	118.5	344.25	260.55	83.70

TILLAGE

1 Planted with Allis-Chalmers 333 no-till air planter
2 Fall plow-cultimulcher 2X, planted with same planter
3 Planted with same planter
4 Fall disc 1X, planted with same planter
5 Fall chisel-tandem disc 1X, planted with same planter

PLOT NO.	1	2	3	4	5
Tillage treatment	No-till	Fall plow	No-till	Fall disc	Fall chisel
TOTAL VALUE	$348.43	$352.37	$334.03	$295.95	$344.25
Seed, lime, misc.	$ 40.00	40.00	40.00	40.00	40.00
Fertilizer:					
Broadcast: (170# 0-44-0 $20.99 (400# 0-0-60 27.60	48.59	48.59	48.59	48.59	48.50
Starter 200# 14-21-9+1z+10s	23.00	23.00	23.00	23.00	23.00
Nitrogen applied as 28-0-0	46.32	46.32	46.32	46.32	46.32
Chemicals:					
Herbicides	26.93	20.50	26.93	26.93	20.50
Insecticides	10.53	10.53	10.53	10.53	10.53
Interest: 6 months @ 12%	13.68	13.23	13.68	13.68	13.23
TOTAL VARIABLE COSTS	$209.05	$202.17	$209.05	$209.05	$202.17
Machinery (custom rates)					
Primary tillage	$ -	$ 11.00	$ -	$ 5.50	$ 8.25
Secondary tillage	-	9.00	-	-	5.50
Planting	11.00	8.00	11.00	11.00	8.00
Cultivation	-	-	-	-	-
Spraying, spread fertilizer	6.00	6.00	6.00	6.00	6.00
Apply ammonia	-	-	-	-	-
Harvest	19.50	19.50	19.50	19.50	19.50
Trucking	10.97	10.99	10.52	9.37	11.13
TOTAL MACHINERY COSTS	$ 47.47	$ 64.49	$ 47.02	$ 51.37	$ 58.38
TOTAL COSTS	$256.52	$266.66	$256.07	$260.42	$260.55
RETURN TO LAND, MANAGEMENT	$ 91.91	$ 85.71	$ 77.96	$ 35.53	$ 83.70
Time for tillage (minutes, estimated)	15	41	15	23	33
Diesel fuel for tillage (gallons, estimated)	.75	3.30	.75	1.40	2.45

/1 Rye cover crop seeded resulting in a half stand on the plot.

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

Don Phenicie, 5661 Stevens Road, New Washington, Ohio 44854 C2

PLOT DETAILS

Planted Pioneer 3780 in 5 different side-by-side tillage plots on May 29 in 30-inch rows. All plots were treated the same except for tillage. Intended seed drop was 34,000 of which 30,100 plants emerged in Plot #1, 30,800 in Plot #2, 33,400 in Plot #3, 29,450 in Plot #4, and 29,700 in Plot #5. Soil present is Bennington silt loam. Tile drainage is a random system. 1979 crop was conventional corn with Plot #1 having a rye cover crop which had about a half stand. 170# 0-44-0 and 400# 0-0-60 was fall broadcasted. 200# 14-21-9+1z+10s was applied next to the row. 193# N was applied as 28% for a total N-P_2O_5-K_2O as follows: 221-117-258. 2½ pt. Dual 8E and 2½# Princep 80W were applied to all plots just after planting using 65 gallons/acre of 28% as carrier. In Plots #1 and #3, 1 pt. Paraquat CL plus 16 oz. X-77 spreader/100 gallons 28% was also applied with the 28% and residual herbicides. Excellent grass and broadleaf weed control in all plots. 13.5# Furadan 10G was applied in the furrow. No insect problems. Harvested October 9.

Early planting appears to be no problem for conservation tillage systems. Here Don Phenicie plants the no-till and fall plow portions of his diversified tillage field on April 29.

1980 TILLAGE COMPARISION CULTURAL & ECONOMIC DATA

Jim and Gerald Nedolast, 6496 Wynn Road, New Washington, Ohio 44854 C3

PLOT NO.	TILLAGE	CROP	FINAL STAND	MOIS-TURE	TEST WEIGHT	YIELD DRY/BU/AC	TOTAL VALUE	TOTAL COSTS	RETURN TO LAND,MGT.
1	No-till	Corn	19,750	24.15	50.5	106.3	$297.59	$217.23	$ 80.36
2	Fall plow	Corn	21,300	22.8	53.0	133.5	378.59	225.49	153.10
3	No-till	Corn	19,450	21.45	53.0	100.9	289.68	216.45	73.23
4	Fall plow	Corn	23,150	19.95	55.0	129.9	337.36	224.84	152.52
5	No-till	Corn	22,850	19.9	55.0	126.9	368.65	218.75	149.90

TILLAGE

1 Planted Select Seeds 4700 with Allis Chalmers 600 no-till plate planter
2 Fall plow-field cultivate, harrogator and packer, planted Select Seeds 4700 with same planter
3 Planted Select Seeds 3100 with the same planter
4 Fall plow-field cultivate, harrogator and packer, planted Select Seeds 3100 with same planter
5 Planted Select Seeds 3300 with same planter

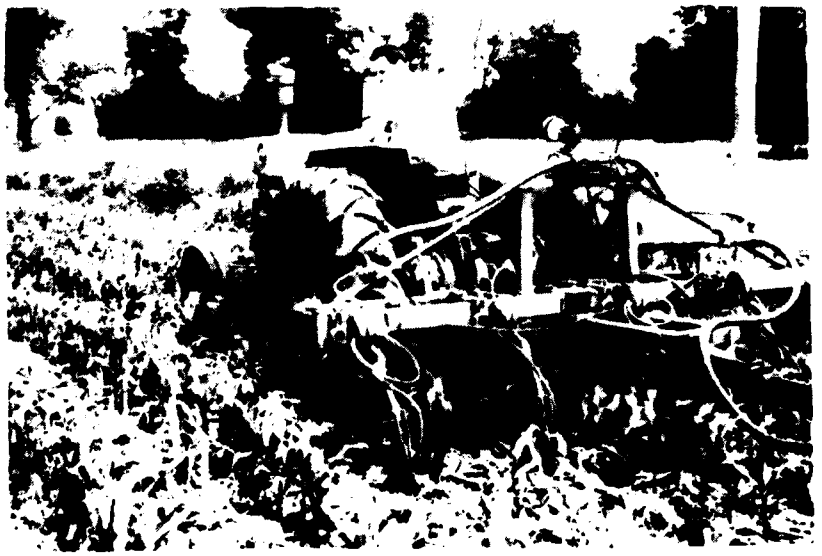
PLOT NO.	1	2	3	4	5
Tillage treatment	No-till	F. plow	No-till	F. plow	No-till
TOTAL VALUE	$297.59	$378.59	$289.68	$377.36	$368.65
Seed, lime, misc.	$ 40.00	$ 40.00	$ 40.00	$ 40.00	$ 40.00
Fertilizer:					
Starter 10 gallons 9-18-9	34.00	34.00	34.00	34.00	34.00
Foliar 3.5 gallons 9-18-9	11.20	11.20	11.20	11.20	11.20
N applied as 28-0-0	21.60	-	21.60	-	21.60
N applied as 82-0-0	10.40	26.24	10.40	26.24	10.40
Chemicals:					
Herbicides	31.75	20.50	31.75	20.50	31.75
Insecticides	3.24	3.24	3.24	3.24	3.24
Interest: 7 months @ 12%	11.14	9.95	11.14	9.95	11.14
TOTAL VARIABLE COSTS	$163.33	$145.13	$163.33	$145.13	$163.33
Machinery (custom rates)					
Primary tillage	$ -	$ 11.00	$ -	$ 11.00	$ -
Secondary tillage	-	11.50	-	11.50	-
Planting	11.00	8.00	11.00	8.00	11.00
Cultivation	-	4.50	-	4.50	-
Spraying, spread fertilizer	7.00	7.00	7.00	7.00	7.00
Apply ammonia	6.00	6.00	6.00	6.00	6.00
Harvest	19.50	19.50	19.50	19.50	19.50
Trucking	10.40	12.86	9.62	12.21	11.92
TOTAL MACHINERY COSTS	$ 53.90	$ 80.36	$ 53.12	$ 79.71	$ 55.42
TOTAL COSTS	$217.23	$225.49	$216.45	$224.84	$218.75
RETURN TO LAND, MANAGEMENT	$ 80.36	$153.10	$ 73.23	$152.52	$149.90
Time for tillage (minutes, estimated)	21	60	21	60	21
Diesel fuel for tillage (gallons, est.)	1.40	4.64	1.40	4.64	1.40

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

Jim and Gerald Nedolast, 6496 Wynn Road, New Washington, Ohio 44854 C3

PLOT DETAILS

Planted Select Seeds 4700 in Plots #1 and #2, Select Seeds 3100 in Plots #3 and #4 and Select Seeds 3300 in Plot #5 on May 5 in 30-inch rows. Plots #1, #3 and #5 were planted via no-tillage, while Plots #2 and #4 were fall plowed. Intended seed drop was 28,000 of which 24,400 plants emerged in Plot #1, 25,950 in Plot #2, 26,550 in Plot #3, 26,400 in Plot #4 and 26,700 in Plot #5. Soil present is Lenawee silty clay loam. Random tile present but a systematic tile system is needed for better subsurface drainage. 1979 crop was no-till corn with a rye cover crop seeding which never attained a good stand or growth in Plots #1, #3 and #5, while Plots #2 and #4 were preceeded by conventional corn. All plots received 10 gallons 9-18-9 at planting next to the row and 3.5 gallons 9-18-9 as a foliar spray application in late June. The no-till plots (#1, #3 and #5) had 90# N applied as 28% just after planting and 65# N applied as side dress anhydrous ammonia in late June. The conventional plots (#2 and #4) had 164# N applied as preplant anhydrous ammonia. The total N-P_2O_5-K_2O for the no-till plots #1, #3 and #5 were as follows: 165-27-13 while the conventional Plots #2 and #4 had 178-27-13. Potash fertilizer was recommended and planned but was never applied. 1 qt. Paraquat CL with 16 oz. X-77 spreader/100 gallons 28%, $2\frac{1}{2}$# Princep 80W and $2\frac{1}{2}$ pt. Dual 8E was applied in the no-till plots using 30 gallons/acre of 28% as carrier. The same residual herbicides and rates were used in the conventional plots applied using water as carrier without the Paraquat CL and X-77 spreader. Good grass control and excellent broadleaf weed control. Some green foxtail in the no-till plots. Also some patches of foxtail due to plugged spray nozzle in the no-till plots. 3/4 pt. Dyfonate flowable was applied next to the row and Isotox "F" seedtreater was used. No insect problems. Harvested October 14.



By placing coulters ahead of the applicator knives, anhydrous ammonia may be successfully applied in no-till systems. Jim Nedolast found anhydrous nitrogen application to work quite well in this second year no-till corn field.

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

Paul Price, 6236 South Township Road 173, Bloomville, Ohio 44818 C4

PLOT NO.	TILLAGE	CROP	FINAL STAND	MOIS-TURE	TEST WEIGHT	YIELD DRY/BU/AC	TOTAL VALUE	TOTAL COSTS	RETURN TO LAND, MGT.
1	No-till	Corn	24,400	23.26	54.25	155.1	$437.98	$296.61	$141.37

TILLAGE

1 Planted with John Deere 7000 conservation tillage planter

PLOT NO.	1
Tillage treatment	No-till
TOTAL VALUE	$437.98
Seed, lime, misc.	$ 40.00
Fertilizer:	
Broadcast 614# 3-9-27	45.44
Starter 33 gallons 9-27-3+2s	46.02
Nitrogen applied as 28-0-0	9.17
Nitrogen applied as 28-0-0	35.06
Chemicals:	
Herbicides	39.36
Insecticides	11.18
Interest: 7 months @ 12%	15.84
TOTAL VARIABLE COSTS	$242.07
Machinery (custom rates)	
Primary tillage	$ -
Secondary tillage	-
Planting	11.00
Cultivation	-
Spraying, spread fertilizer	9.00
Apply ammonia	-
Harvest	19.50
Trucking	15.04
TOTAL MACHINERY COSTS	$ 54.54
TOTAL COSTS	$296.61
RETURN TO LAND, MANAGEMENT	$141.37

Time for tillage (minutes, estimated)	15
Diesel Fuel for tillage (gallons, est.)	.75

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

Paul Price, 6326 South Township Road 173, Bloomville, Ohio 44818 C4

PLOT DETAILS

Planted Funks 4323 on April 30 in 30" rows. Intended seed drop was 30,200 of which 26,250 plants emerged in the Tiro, Randolph, Channahon silt loam soils. No tile drainage present. Natural soil drainage is good in this field. 1979 crop was no-till corn. 614# 3-9-27 was broadcasted in the spring. 33 gallons 9-27-3+2s was applied next to the row at planting. 12.8 gallons 28% combination with 50 gallons water was applied just after planting with the herbicides. 146# N was applied as 28% for a total N-P_2O_5-K_2O as follows: 236-157-177. 1.2 qt. Paraquat CL with 8 oz. X-77 spreader per 100 gallons water, 1.5 qt. Aatrex 4L, 2.5 qt. Bladex 4L, and 2.4 pt. Dual 8E were applied just after planting using 53 gallons water including 12.8 gallons 28% as carrier. Excellent grass and broadleaf weed control. 13.5# Furadan 10G was applied in the furrow and Isotox "D" seedtreater was used. No insect problems. Anthracnose stalk rot was present throughout the plot and was severe enough in several places to lower yield. Harvested October 8.

Dave Wurm, Honey Creek Project Conservationist, prepares to check the yield of Paul Price's second year no-till corn. Checks show a yield increase the second year of 18 bu/ac, from 138 to 155 bushels.

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

Tom Depinet, 9928 East Township Road 106, Bloomville, Ohio 44818 C5

PLOT NO.	TILLAGE	CROP	FINAL STAND	MOIS-TURE	TEST WEIGHT	YIELD DRY/BU/AC	TOTAL VALUE	TOTAL COSTS	RETURN TO LAND, MGT.
1	Tandem disc	Corn	22,150	26.25	53.0	98.6	$270.96	$252.36	$ 18.60
2	No-till	Corn	20,250	25.3	53.0	101.5	281.55	246.10	35.45

TILLAGE

1 Spring tandem disc 2X, planted with John Deere 7000 conservation tillage planter, row cultivated 1X
2 Planted with same planter

PLOT NO.	1	2
Tillage treatment	Spring tandem disc	No-till
TOTAL VALUE	$270.96	$281.55
Seed, lime, misc.	$ 40.00	$ 40.00
Fertilizer:		
Broadcast 350# 6-15-40	33.25	35.25
Starter 250# 8-32-16	30.00	30.00
Nitrogen applied as 28-0-0	46.32	46.32
Chemicals:		
Herbicides	17.25	23.69
Insecticides	11.25	11.25
Interest: 7 months @ 12%	12.46	13.06
TOTAL VARIABLE COSTS	$190.53	$199.57
Machinery (custom rates)		
Primary tillage	$ -	$ -
Secondary tillage	11.00	-
Planting	11.00	11.00
Cultivation	4.50	-
Spraying, spread fertilizer	6.00	6.00
Apply ammonia	-	-
Harvest	19.50	19.50
Trucking	9.83	10.03
TOTAL MACHINERY COSTS	$ 61.83	$ 46.53
TOTAL COSTS	$252.36	$246.10
RETURN TO LAND,MANAGEMENT	$ 18.60	$ 35.45

Time for tillage (minutes, estimated)	32	15
Diesel fuel for tillage (gallons, estimated)	2.44	.75

1980 TILLAGE COMPARISON CULTURAL & ECONOMICAL DATA

Tom Depinet, 9928 East Township Road 106, Bloomville, Ohio 44818 C5

PLOT DETAILS

Planted Gutwein 46 in two plots on April 25 in 30-inch rows. All plot imputs were kept the same except for tillage. Intended seed drop was 29,900 of which 24,350 plants emerged in Plot #1 and 24,550 plants emerged in Plot #2. Soils present are Morley and Blount silt loams. Tile drainage is systematic. 1979 crop was conventional corn in both plots. 350# 6-15-40 was fall broadcasted. 250# 8-32-16 was applied next to the row. 193# N was applied as 28% for a total $N-P_2O_5-K_2O$ as follows: 234-132-180. Too high a yield goal may have been chosen when looking at soil test and past field history. 1 pt. Paraquat CL with 16 oz. X-77 spreader per 100 gallons of 28%, 2 qt. Aatrex 4L, and 2½ pt. Dual 8E were applied just after planting using 65 gallons/acre 28% as carrier. Plot #1 had no Paraquat CL or X-77 spreader applied. Excellent grass and broadleaf weed control on both plots. Plot #1 had a lot of volunteer corn and was cultivated once in an attempt to eliminate most of it. 13.6# Furadan 10G was banded over the row and Isotox "D" seedtreater was used. No insect problems. Harvested October 11.

As in conventional corn after corn, insecticides applied at planting reduce the chance of rootworm or other insect damage in conservation tillage systems, too. Crop rotations serve this same purpose and at the same time eliminate the need for some insecticides. Using rotations also provide a cheap way to reduce erosion.

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

Paul and Carl Ziegler, 6661 East County Road 12, Bloomville, Ohio 44818 C6

PLOT NO.	TILLAGE	CROP	FINAL STAND	MOIS-TURE	TEST WEIGHT	YIELD DRY/BU/AC	TOTAL VALUE	TOTAL COSTS	RETURN TO LAND, MGT.
1	No-till	Corn	24,650	23.4	56.0	148.5	$419.28	$218.81	$200.47
2	Spring plow	Corn	26,100	23.16	56.5	157.7	445.36	227.58	217.78
3	Spring chisel	Corn	20,250	22.27	56.5	146.7	417.65	226.64	191.01

TILLAGE

1 Planted with John Deere 7000 conservation planter
2 Spring plow-disc and cultipacker 1X, planted with same planter
3 Spring chisel-disc and cultipacker 1X, planted with same planter

PLOT NO.	1	2	3
Tillage treatment	No-till	Spring plow	Spring chisel
TOTAL VALUE	$419.28	$445.36	$417.65
Seed, lime, misc.	$ 40.00	$ 40.00	$ 40.00
Fertilizer:			
Broadcast 200# 0-0-60	13.80	13.80	13.80
Starter 250# 11-33-11+2s	30.00	30.00	30.00
Nitrogen applied as 28-0-0	41.14	41.14	41.14
Chemicals:			
Herbicides	20.79	15.56	15.56
Insecticides	11.18	11.18	11.18
Interest: 7 months @ 12%	10.98	10.62	10.62
TOTAL VARIABLE COSTS	$167.89	$162.30	$162.30
Machinery (custom rates)			
Primary tillage	$ -	$ 11.00	$ 8.25
Secondary tillage	-	5.50	5.50
Planting	11.00	8.00	11.00
Cultivation	-	-	-
Spraying, spread fertilizer	6.00	6.00	6.00
Apply ammonia	-	-	-
Harvest	19.50	19.50	19.50
Trucking	14.42	15.28	14.09
TOTAL MACHINERY COSTS	$ 50.92	$ 65.28	$ 64.34
TOTAL COSTS	$218.81	$227.58	$226.64
RETURN TO LAND, MANAGEMENT	$200.47	$217.78	$191.01

Time for tillage (minutes, estimated)	15	37	38
Diesel fuel for tillage (gallons, est.)	.75	3.15	2.55

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

Paul and Carl Ziegler, 6661 East County Road 12, Bloomville, Ohio 44818 C6

PLOT DETAILS

Planted DeKalb XL55A in three plots on April 29 in 30-inch rows. All plot inputs were kept the same except for tillage. Intended seed drop was 29,900 of which 25,750 plants emerged in Plot #1, 26,500 plants emerged in Plot #2, and 22,100 plants emerged in Plot #3. Soil present is Tiro silt loam. No tile drainage present, natural soil drainage is good in this field. 1979 crop was conventional corn. 200# 0-0-60 was spring broadcasted. 250# 11-33-11+2s was applied next to the row. 171# N was applied as 28% for a total N-P_2O_5-K_2O as follows: 199-82-148. 8 pt. Paraquat CL with 8 oz. X-77 spreader per 100 gallons 28%, 2.4 pt. Dual 8E and 1.5 qt. Aatrex 4L were applied just after planting using 57.7 gallons 28% as carrier. The same residual herbicides were applied on Plots #2 and #3. Excellent grass and broadleaf weed control in all plots. 13.5# Furadan 10G was applied in the furrow and Isotox "D" seedtreater was used. No insect problems. Harvested October 23.

Various types of reduced tillage options exist which decrease reliance on "contact" herbicides yet still afford protection against arosion. Here Paul and Carl Ziegler compare the effects of different amounts of corn residue on soil loss and crop response.

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

Donald Crum, 5473 New Haven Road, Shelby, Ohio 44875 C7

PLOT NO.	TILLAGE	CROP	FINAL STAND	MOIS-TURE	TEST WEIGHT	YIELD DRY/BU/AC	TOTAL VALUE	TOTAL COSTS	RETURN TO LAND, MGT.
1	No-till	Corn	22,150	28.18	53.0	114.6	$308.75	$257.04	$ 51.71

TILLAGE

1 Planted with Buffalo no-till slot planter

PLOT NO.	1
Tillage treat	No-till
TOTAL VALUE	$308.75
Seed, lime, misc.	$ 40.00
Fertilizer:	
Broadcast 300# 0-14-42	25.95
Starter 200# 8-32-16	24.00
Nitrogen applied as 28-0-0	66.24
Chemicals:	
Herbicides	29.83
Insecticides	9.23
Interest: 7 months @ 12%	13.67
TOTAL VARIABLE COSTS	$208.92
Machinery (custom rates)	
Primary tillage	$ -
Secondary tillage	-
Planting	11.00
Cultivation	-
Spraying, spread fertilizer	6.00
Apply ammonia	-
Harvest	19.50
Trucking	11.62
TOTAL MACHINERY COSTS	$ 48.12
TOTAL COSTS	$257.04
RETURN TO LAND, MANAGEMENT	$ 51.71

Time for tillage (minutes, estimated)	15
Diesel fuel for tillage (gallons, est.)	.75

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

Donald Crum, 5473 New Haven Road, Shelby, Ohio 44875 C7

PLOT DETAILS

Planted Pioneer 3518 on May 5 in 38-inch rows. Intended seed drop was 27,500 of which 27,050 plants emerged in the Pewamo silty clay loam and Alexandria, Cardington and Bennington silt loams. Predominent soil type in the plot is Cardington silt loam. No tile drainage present. 1979 crop was no-till soybeans with a late seeded wheat cover crop that did not make much growth. Lime at 4 tons per acre was broadcasted in the fall after previous crop was harvested as part of his normal liming program. 300# 0-14-42 was spring broadcasted. 200# 8-32-16 was applied next to the row and 276# N was applied as 28% for a total N-P_2O_5-K_2O as follows: 292-106-158. 1.5 pt. Paraquat CL with 16 oz. X-77 spreader per 100 gallons 28%, 3 qt. Lasso 4E and 2.5# Princep 80W were applied just after planting using 93 gallons of 28% as carrier. Excellent grass and broadlead weed control. 11# Furadan 10G banded over the row and Isotox "D" seed-treater used. No insect problems. Received some hail damage in August. Harvested October 9.

A fertility program based on soil tests and expected yields helps insure crop successes. In a strict no-till system, maintaining surface soil pH is required for proper performance of triazine herbicides.

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

Jason Kalb, 6010 Vorndron Road, New Washington, Ohio 44854 C8

PLOT NO.	TILLAGE	CROP	FINAL STAND	MOIS-TURE	TEST WEIGHT	YIELD DRY/BU/AC	TOTAL VALUE	TOTAL COSTS	RETURN TO LAND, MGT.
1	No-till with rye	Corn	21,150	23.65	53.5	124.5	$350.50	$250.79	$ 99.71
2	No-till	Corn	21,150	24.8	53.0	110.3	307.36	241.59	65.77
3	Spring tandem disc	Corn	21,300	24.5	52.5	109.0	305.04	237.24	67.80

TILLAGE

1 Planted with Allis Chalmers 600 no-till plate planter
2 Planted with the same planter
3 Spring tandem disc 2X, planted with the same planter

PLOT NO.	1	2	3
Tillage treatment	No-till with rye	No-till	Tandem disc
TOTAL VALUE	$350.50	$307.36	$305.04
Seed, lime, misc.	$ 40.00	$ 40.00	$ 40.00
Fertilizer:			
Broadcast: (100# 0-44-0 $12.35 (200# 0-0-60 13.80	26.15	26.15	26.15
Starter 20 gallons 9-27-3	27.35	27.35	27.35
Nitrogen applied as 28-0-0	28.56	28.56	28.56
Nitrogen applied as 82-0-0	13.12	13.12	13.12
Chemicals:			
Herbicides	29.57	29.57	18.17
Insecticides	15.78	11.18	11.18
Interest: 7 months @ 12%	12.64	12.31	11.52
TOTAL VARIABLE COSTS	$193.17	$188.24	$176.05
Machinery (custom rates)			
Primary tillage	$ -	$ -	$ 5.50
Secondary tillage	-	-	5.50
Planting	11.00	11.00	8.00
Cultivation	-	-	-
Spraying, spread fertilizer	9.00	6.00	6.00
Apply ammonia	6.00	6.00	6.00
Harvest	19.50	19.50	19.50
Trucking	12.12	10.85	10.69
TOTAL MACHINERY COSTS	$ 57.62	$ 53.35	$ 61.19
TOTAL COSTS	$250.79	$241.59	$237.24
RETURN TO LAND, MANAGEMENT	$ 99.71	$ 65.77	$ 67.80
Time for tillage (minutes, estimated)	21	21	32
Diesel fuel for tillage (gallons, est.)	1.40	1.40	2.60

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

Jason Kalb, 6010 Vorndron Road, New Washington, Ohio 44854 C8

PLOT DETAILS

Planted Pioneer 3518 in three plots on May 1 in 30-inch rows. Intended seed drop was 29,000 on which 24,600 plants emerged in Plot #1, 25,850 plants emerged in Plot #2 and 25,850 plants emerged in Plot #3. All plot inputs were the same except for tillage. Soils present are Miro and Bennington silt loams. Tile drainage is random in lows. 1979 crop was conventional soybeans. Plot #1 had a 12-inch rye cover crop established. 100# 0-44-0 and 200# 0-0-60 was fall broadcasted. 20 gallons 9-27-3 was applied next to the row. 119# N was applied as 28% and 82# N was applied as dest plant, side-dress anhydrous ammonia for a total $N-P_2O_5-K_2O$ as follows: 221-105-[illegible]. 1 qt. Paraquat CL with 16 oz. X-77 spreader per 100 gallons 28%, 2.5 qt. Atrex 4L and 3 qt. Lasso 4E was applied just after planting using 40 gallons per acre of 28% as carrier. Plot #3 had no Paraquat CL or X-77 spreader applied. Excellent grass and broadleaf weed control in all plots. 13.5# Furadan 10G was applied in the furrow in Plot #1 and Isotox "D" seedtreater was used in all plots. Plot #1 was treated on June 11 with 2 qt. Toxaphene 6E for armyworm infestation. No other insect problems. Harvested on October 20.

Application of anhydrous nitrogen 4 weeks after planting helped Jason Kalb produce this even stand of vigorous no-till corn after soybeans. Splitting nitrogen application between 28% at planting and anhydrous helps insure sufficient nitrogen as the crop needs it.

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

Mark Fritz, Rt. 2, Box 72, Attica, Ohio 44807 C9

PLOT NO.	TILLAGE	CROP	FINAL STAND	MOIS-TURE	TEST WEIGHT	YIELD DRY/BU/AC	TOTAL VALUE	TOTAL COSTS	RETURN TO LAND, MGT.
1	Spring plow	Corn	23,800	23.45	56.5	130.3	$367.88	$233.37	$134.51
2	No-till with rye	Corn	26,050	22.75	57.0	81.5	231.13	241.07	-9.94
3	No-till with rye	Corn	22,200	21.74	54.5	102.5	293.12	243.01	50.11
4	No-till with rye	Corn	22,550	18.2	57.0	112.7	331.12	243.62	87.50

TILLAGE

1 Spring plow-disc and drag 1X, field cultivate and drag 1X, planted DeKalb XL55A with Allis Chalmers 333 no-till air planter
2 Planted DeKalb XL55A with the same planter
3 Planted Pioneer 3529 with the same planter
4 Planted Bojac X-14 with the same planter

PLOT NO.	1	2	3	4
Tillage treatment	S. plow	No-till/rye	No-till/rye	No-till/rye
TOTAL VALUE	$367.88	$231.13	$293.12	$331.12
Seed, lime, misc.	$ 40.00	$ 40.00	$ 40.00	$ 40.00
Fertilizer:				
Broadcast 200# 0-0-60	13.80	13.80	13.80	13.80
Starter 240# 6-24-24	24.72	24.72	24.72	24.72
Nitrogen applied as 28-0-0	53.42	53.42	53.42	53.42
Chemicals:				
Herbicides	21.34	33.31	33.31	33.31
Insecticides	.65	15.78	15.78	15.78
Interest: 7 months @ 12%	10.78	12.67	12.67	12.67
TOTAL VARIABLE COSTS	$164.71	$193.70	$193.70	$193.70
Machinery (custom rates)				
Primary tillage	$ 11.00	$ -	$ -	$ -
Secondary tillage	11.50	-	-	-
Planting	8.00	11.00	11.00	11.00
Cultivation	-	-	-	-
Spraying, spread fertilizer	6.00	9.00	9.00	9.00
Apply ammonia	-	-	-	-
Harvest	19.50	19.50	19.50	19.50
Trucking	12.66	7.87	9.81	10.42
TOTAL MACHINERY COSTS	$ 68.66	$ 47.37	$ 49.31	$ 49.92
TOTAL COSTS	$233.37	$241.07	$243.01	$243.62
RETURN TO LAND, MANAGEMENT	$134.51	$ -9.94	$ 50.11	$ 87.50
Time for tillage (minutes, estimated)	45	15	15	15
Diesel fuel for tillage (gallons, est.)	3.80	.75	.75	.75

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

Mark Fritz, Rt. 2, Box 72, Attica, Ohio 44807 C9

PLOT DETAILS

Planted DeKalb XL70A in Plots #1 and #2, Pioneer 3529 in Plot #3 and Bojac X-14 in Plot #4. Intended seed drop was 31,900 but, because of planter speed, approximately 35,000 seeds were planted per acre. Emergence in plots were as follows: 24,500 plants in Plot #1, 30,000 plants in Plot #2, 34,400 plants in Plot #3, and 28,950 plants in Plot #4. Soils present are bennington and Cardington silt loams. Tile drainage is a random system. 1979 crop was conventional soybeans with a 26-inch rye cover crop established in Plots #2, #3, and #4. 200# 0-0-60 was fall broadcasted. 240# 6-24-24 was applied next to the row. 222.6# N was applied as 28% for a total N-P_2O_5-K_2O for all plots as follows: 237-58-178. Leaf and grain sample analysis showed severe nitrogen deficiency in the no-till corn. Deficiency arose from weather conditions favorable for volatilization (urea part of the 28% on the rye breaking down and escaping into the atmosphere), specifically, an unusually extended dry and sunny period (7-8 days without rain) after application. 1 qt. Paraquat CL with 16 oz. X-77 spreader per 100 gallons 28%, 1.5 qt. Aatrex 4L 1 qt. Bladex 4L and 2.75 pt. Dual 8E was applied just after planting using 75 gallons per acre 28% as carrier. Paraquat CL and X-77 spreader were not applied to Plot #1. Excellent grass and broadleaf weed control in all plots. 13.5# Furadan 10G was applied in the furrow in Plots #2, #3 and #4. Isotox "D" was used in all plots. Treated Plots #2, #3 and #4 with 2 qt. Toxaphene 6E for armyworm infestation on June 12. No other insect problems. Harvested October 23.

Rye cover crops after soybeans provide several advantages when planting no-till corn. Erosion control over winter, nutrient retention, early spring uptake of surface soil moisture and late summer moisture conservation are some of the more important advantages.

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

Geissman Farms, 6471 Cook Road, New Washington, Ohio 44854 C10

PLOT NO.	TILLAGE	CROP	FINAL STAND	MOIS-TURE	TEST WEIGHT	YIELD DRY/BU/AC	TOTAL VALUE	TOTAL COSTS	RETURN TO LAND, MGT.
1	No-till with rye	Corn	21,800	23.1	54.25	109.6	$304.45	$259.67	$ 44.78
2	No-till	Corn	24,050	23.2	54.25	116.8	329.84	252.47	77.38
3	Field cultivate	Corn	22,900	23.1	52.5	123.1	347.67	252.27	95.40
4	Spring plow	Corn	23,250	24.3	52.0	120.7	337.84	263.17	74.67

TILLAGE

1 Planted with Allis Chalmers 600 no-till air planter
2 Planted with same planter
3 Field cultivate 1X, planted with same planter
4 Spring plow-field cultivated 2X, planted with same planter

PLOT NO.	1	2	3	4
Tillage treatment	No-till/rye	No-till	Field cultivate	Spring plow
TOTAL VALUE	$304.45	$329.84	$347.67	$337.84
Seed, lime, misc.	$ 40.00	$ 40.00	$ 40.00	$ 40.00
Fertilizer:				
Broadcast: (100# 0-44-0 $12.35; 250# 0-0-60 17.25)	29.60	29.60	29.60	29.60
Starter 12 gallons 9-18-9	38.40	38.40	38.40	38.40
Nitrogen applied as 28-0-0	46.32	46.32	46.32	46.32
Chemicals:				
Herbicide	26.40	26.40	17.25	17.25
Insecticide	15.13	10.53	10.53	10.53
Interest: 7 months @ 12%	13.71	13.39	12.75	12.75
TOTAL VARIABLE COSTS	$209.56	$204.64	$194.85	$194.85
Machinery (custom rates)				
Primary tillage	$ -	$ -	$ 6.00	$ 11.00
Secondary tillage	-	-	6.00	12.00
Planting	11.00	11.00	8.00	8.00
Cultivation	-	-	-	-
Spraying, spread fertilizer	9.00	6.00	6.00	6.00
Apply ammonia	-	-	-	-
Harvest	19.50	19.50	19.50	19.50
Trucking	10.61	11.32	11.92	11.82
TOTAL MACHINERY COSTS	$ 50.11	$ 47.82	$ 57.42	$ 68.32
TOTAL COSTS	$259.67	$252.46	$252.27	$263.17
RETURN TO LAND MANAGEMENT	$ 44.78	$ 77.38	$ 95.40	$ 74.67
Time for tillage (minutes, estimated)	15	15	26	45
Diesel fuel for tillage (gallons, est.)	.75	.75	1.95	3.80

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

Geissman Farms, 6471 Cook Road, New Washington, Ohio 44854 C10

PLOT DETAILS

Planted Pioneer 3518 in four plots on April 30 in 30-inch rows. Intended seed drop was 27,800 of which 25,200 plants emerged in Plot #1, 25,050 plants emerged in Plot #2, 25,800 plants emerged in Plot #3, and 26,450 plants emerged in Plot #4. Soils present are Tiro, Condit and Cardington silt loams. Tile drainage is random. 1979 crop was conventional soybeans. Plot #1 had a 10-inch rye cover crop at planting. 100# 0-44-0 and 250# 0-0-60 were fall broadcasted. 12 gallons 9-18-9 were applied next to the row. 193# N was applied as 28% for a total N-P_2O_5-K_2O on all plots as follows: 205-68-162. Plot #1 showed similar nitrogen deficiency problems as discussed in the Mark Fritz no-till corn plots. 1.5 qt. Paraquat CL with 16 oz. X-77 spreader per 100 gallons 28%, 2 qt. Aatrex 4L and 2.5 pt. Dual 8E were applied on Plots #1 and #2. Plots #3 and #4 had no Paraquat CL or X-77 spreader applied. All plots had 65 gallons 28% per acre as carrier. Excellent grass and broadleaf control on all plots. 13.5# Furadan 10G was applied in the furrow in all plots. Plot #1 was treated on June 12 with 2 qt. Toxaphene 6E for armyworm infestation. Aphid infestation in all plots. No other insect problems. Harvested October 20.

Burton and Bob Geissman adjust their 12-row AC no-till planter before planting corn after soybeans, both conventionally and no-till. On these planters, the addition of a 7" press wheel after the double disc seed openers can greatly improve seed-soil contact, and result in improved emergence.

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

Sam Allen, 7155 East County Road 6, Bloomville, Ohio 44818 — C11

PLOT NO.	TILLAGE	CROP	FINAL STAND	MOIS-TURE	TEST WEIGHT	YIELD DRY/BU/AC	TOTAL VALUE	TOTAL COSTS	RETURN TO LAND, MGT.
1	No-till with rye	Corn	21,400	21.5	56.5	92.9	$266.70	$249.98	$ 16.72
2	Spring plow	Corn	19,150	21.95	56.5	112.2	320.80	265.78	55.02
3	No-till with rye	Corn	21,500	23.9	55.0	87.6	246.27	249.67	-3.40

TILLAGE

1 Planted Funks 4321A with Allis Chalmers 333 no-till plate planter
2 Spring plow-tandem disc 1X, field cultivate 1X, cultimulcher 1X, planted Funks 4321A with same planter
3 Planted DeKalb XL55A with same planter

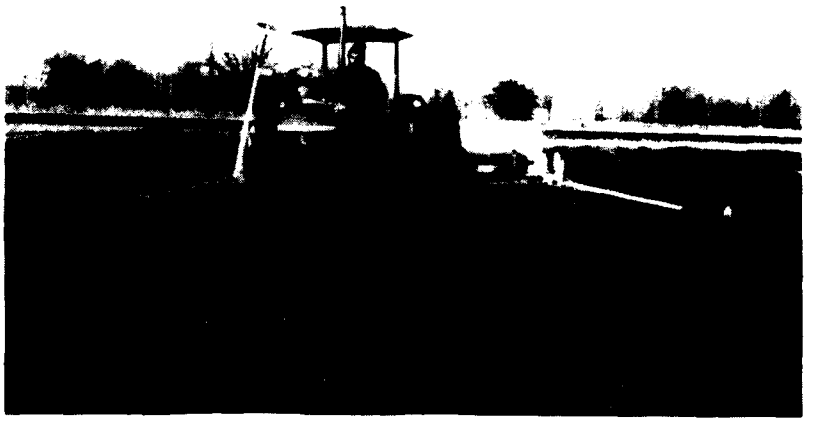
PLOT NO.	1	2	3
Tillage treatment	No-till/rye	Spring plow	No-till/rye
TOTAL VALUE	$266.70	$320.80	$246.27
Seed, lime, misc.	$ 40.00	$ 40.00	$ 40.00
Fertilizer:			
Broadcast: (111# 0-44-0 $13.71; (273# 0-0-60 18.84	32.55	32.55	32.55
Starter 25 gallons 9-27-3+2s	34.89	34.89	34.89
Nitrogen applied as 28-0-0	37.34	37.34	37.34
Chemicals:			
Herbicides	26.70	20.47	26.70
Insecticides	16.95	12.35	16.95
Interest: 7 months @ 12%	13.19	12.43	13.19
TOTAL VARIABLE COSTS	$201.62	$190.03	$201.62
Machinery (custom rates)			
Primary tillage	$ -	$ 11.00	$ -
Secondary tillage	-	16.00	-
Planting	11.00	8.00	11.00
Cultivation	-	4.50	-
Spraying, spread fertilizer	9.00	6.00	9.00
Apply ammonia	-	-	-
Harvest	19.50	19.50	19.50
Trucking	8.86	10.75	8.55
TOTAL MACHINERY COSTS	$ 48.36	$ 75.75	$ 48.05
TOTAL COSTS	$249.98	$265.78	$249.67
RETURN TO LAND, MANAGEMENT	$ 16.72	$ 55.02	$ -3.40
Time for tillage (minutes, estimated)	15	51	15
Diesel fuel for tillage (gallons, estimated)	.75	4.20	.75

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

Sam Allen, 7155 East County Road 6, Bloomville, Ohio 44818 ..... C11

PLOT DETAILS

Planted Funks 4321A in Plots #1 and #2 while Plot #3 had DeKalb XL55A, all planted on April 26 in 30-inch rows. Intended seed drop was 26,100 of which 21,400 plants emerged in Plot #1, 19,150 plants emerged in Plot #2, and 21,500 plants emerged in Plot #3. Soils are Tiro and Bennington silt loams. Tile drainage is random. 1979 crop was conventional soybeans with a 15-inch rye cover crop in Plots #1 and #3. 111# 0-46-0 and 273# 0-0-60 was spring broadcasted. 25 gallons of 29-27-3+2s were applied next to the row. 155.6# N was applied as 28% for a total N-P_2O_5-K_2O on all plots as follows: 181-128-173. Plots #1 and #3 showed similar nitrogen deficiency problems as discussed in the Mark Fritz no-till corn plots. 1 pt. Paraquat CL with X-77 spreader at 16 oz. per 100 gallons 28%, 1.5 qt. Aatrex 4L, 1.5 qt. Bladex 4L and 2.2 pt. Dual 8E were applied just after planting using 52.4 gallons per acre 28% as carrier. Plot #2 did not have Paraquat CL and X-77 spreader applied. Excellent grass and broadleaf weed control in all plots. 15# Furadan 10G was banded in Plots #1 and #3. Isotox "F" seedtreater was used in all plots. Treated Plots #1 and #3 with 2 qt. Toxaphene 6E for armyworm infestation on June 18. Some European corn borer in all plots. No other insect problems. Harvested October 10.



In cover crops, fluted coulters throw out much less soil during planting. Roots on the cover crop hold the soil in place, thus permitting better seed coverage by seed press wheels.

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

Rich Reichert, 16161 East Route 224, Attica, Ohio 44807 — C12

PLOT NO.	TILLAGE	CROP	FINAL STAND	MOIS-TURE	TEST WEIGHT	YIELD DRY/BU/AC	TOTAL VALUE	TOTAL COSTS	RETURN TO LAND, MGT.
1	No-till with rye	Corn	23,250	24.75	55.5	129.3	$360.32	$259.04	$ 91.28
2	Spring plow	Corn	22,000	25.2	55.0	123.3	342.05	259.85	82.20

TILLAGE

1 Planted with John Deere 7000 conservation tillage planter
2 Spring plow-tandem disc with cultipacker 2X, planted with same planter

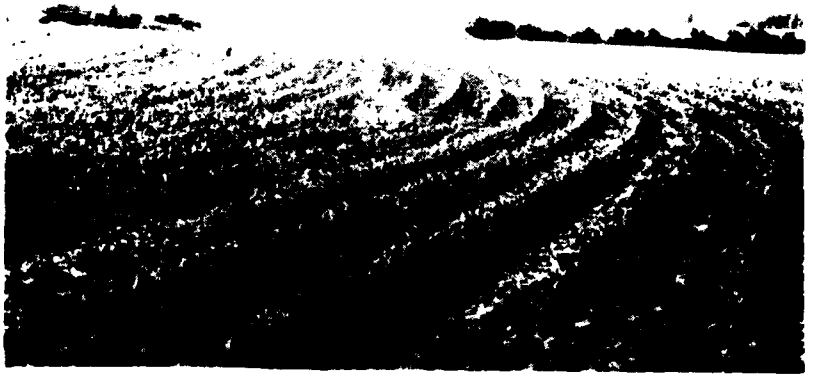
PLOT NO.	1	2
Tillage treatment	No-till with rye	Spring plow
TOTAL VALUE	$360.32	$342.05
Seed, lime, misc.	$ 40.00	$ 40.00
Fertilizer:		
Broadcast: (300# 0-0-60 $20.70 / (100# 18-46-0 14.75	35.45	35.45
Starter 200# 8-32-16	24.00	24.00
Nitrogen applied as 28-0-0	49.92	49.92
Chemicals:		
Herbicides	32.42	20.53
Insecticides	18.06	10.01
Interest: 7 months @ 12%	13.98	12.57
TOTAL VARIABLE COSTS	$213.83	$192.18
Machinery (custom rate)		
Primary tillage	$ -	$ 11.00
Secondary tillage	-	11.00
Planting	11.00	8.00
Cultivation	-	-
Spraying, spread fertilizer	12.00	6.00
Apply ammonia	-	-
Harvest	19.50	19.50
Trucking	12.71	12.17
TOTAL MACHINERY COSTS	$ 55.21	$ 67.67
TOTAL COSTS	$269.04	$259.85
RETURN TO LAND, MANAGEMENT	$ 91.28	$ 82.20
Time for tillage (minutes, estimated)	15	45
Diesel fuel for tillage (gallons, estimated)	.75	3.80

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

Rich Reichert, 16161 East US 224, Attica, Ohio 44807 C12

PLOT DETAILS

Planted DeKalb XL55A in two plots on May 3 in 36" rows. Intended seed drop was 29,000 of which 23,450 plants emerged in Plots #1 and 22,250 plants emerged in Plot #2. Soil present is Blount silt loam. Tile drainage is random. 1979 crop was conventional soybeans with a 11" rye cover crop in Plot #1. 300# 0-0-60 and 100# 18-46-0 were spring broadcasted. 200# 8-32-16 was applied next to the row. 208# N was applied as 28% for a total N-P_2O_5-K_2O in both plots as follows: 242-110-212. 1 qt. Paraquat CL with X-77 spreader at 16 oz. per 100 gallons 28%, 1 qt. Aatrex 4L, 1.5 pt. Bladex 4L, and 3 qt. Lasso 4E were applied using 70 gallons per acre 28% as carrier. Plot #2 had no Paraquat CL or X-77 spreader applied. Excellent grass and broadleaf weed control in both plots. 12# Furadan 10G was applied and Isotox "D" seedtreater was used in both plots. Treated Plot #1 with 2 applications of Toxaphene 6E, one on June 16 at 2 qt. and the other on June 14 at 1.5 qt. for armyworm infestation. No other insect problems. Harvested October 20.



No-till corn on the contour following a rye cover crop after soybeans is extremely effective in halting erosion and nutrient loss. As with conventional fields, no-till fields should be walked at least every 3 days early in the growing season to look for possible weed and insect problems.

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

Jerry Bumb, 2474 East Township Road 163, Sycamore, Ohio 44882 C13

PLOT NO.	TILLAGE	CROP	FINAL STAND	MOIS-TURE	TEST WEIGHT	YIELD DRY/BU/AC	TOTAL VALUE	TOTAL COSTS	RETURN TO LAND, MGT.
1	No-till	Corn	21,200	22.6	56.5	133.9	$380.19	$236.25	$143.94
2	Spring plow	Corn	22,850	23.05	56.5	141.9	401.28	232.91	168.37

TILLAGE

1 Planted with John Deere 7000 conservation tillage planter
2 Spring plow-disc and cultipack 1X, planted with the same planter

PLOT NO.	1	2
Tillage treatment	No-till	Spring plow
TOTAL VALUE	$380.19	$401.28
Seed, lime, misc.	$ 40.00	$ 40.00
Fertilizer:		
Broadcast 400# 0-10-30	34.60	34.60
Starter 213# 6-24-24	21.94	21.94
Nitrogen applied as 28-0-0	39.18	39.18
Chemicals:		
Herbicides	27.72	11.20
Insecticides	11.18	11.18
Interest: 7 months @ 12%	12.22	11.07
TOTAL VARIABLE COSTS	$186.84	$169.17
Machinery (custom rates)		
Primary tillage	$ -	$ 11.00
Secondary tillage	-	5.50
Planting	11.00	8.00
Cultivation	-	-
Spraying, spread fertilizer	6.00	6.00
Apply ammonia	-	-
Harvest	19.50	19.50
Trucking	12.91	13.74
TOTAL MACHINERY COSTS	$ 49.41	$ 63.74
TOTAL COSTS	$236.25	$232.91
RETURN TO LAND, MANAGEMENT	$143.94	$168.37
Time for tillage (minutes, estimated)	15	37
Diesel fuel for tillage (gallons, est.)	.75	3.15

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

Jerry Bumb, 2474 East Township Road 163, Sycamore, Ohio 44882 C13

PLOT DETAILS

Planted Pioneer 3535 in two plots on April 26 in 30-inch rows. Intended seed drop was 26,100 of which 23,050 plants emerged in Plot #1 and 23,850 plants emerged in Plot #2. Soils present are Gallman, Millgrove and Digby loams. No tile drainage present. 1979 crop was conventional soybeans with a very small (5") wheat cover crop established in Plot #1. 400# 0-10-30 was spring broadcasted. 213# 6-24-24 was applied next to the row. 163# N was applied as 28% for a total N-P_2O_5-K_2O on both plots as follows: 176-91-171. 1.5 pt. Paraquat CL with Aquagene I spreader at 16 oz./100 gallons 28%, 2 pt. Dual 8E and 2 qt. Princep 4L were applied on Plot #1 just after planting using 55 gallons/acre 28% as carrier. Plot #2 received 1.3 pt. Dual 8E and 2 qt. Aatrex 4L just after planting using 20 gallons water as carrier and 55 gallons 28% was applied soon after. Excellent grass and broadleaf weed control in both plots. Some milkweed and hemp dogbane in both plots. 13.5# Furadan 10G was applied in the furrow and Isotox "F" was used in both plots at planting. Some European corn borer damage in both plots. No insect problems. Harvested October 10.

Midsummer 1980 corn, spring plow, disc and cultipack versus no-till into a small wheat cover crop after soybeans, on the Jerry Bumb farm. High humidity and high temperatures at this time seemed to impair pollination of many corn varieties in 1980.

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

Bill Reichert, 11331 East Route 224, Attica, Ohio 44807 — C14

PLOT NO.	TILLAGE	CROP	FINAL STAND	MOIS-TURE	TEST WEIGHT	YIELD DRY/BU/AC	TOTAL VALUE	TOTAL COSTS	RETURN TO LAND, MGT.
1	No-till	Corn	23,550	22.85	53.75	130.6	$370.32	$292.63	$ 77.69
2	Spring plow	Corn	21,150	23.45	53.5	129.7	366.19	290.31	75.88

TILLAGE

1 Planted with John Deere 7000 conservation tillage planter
2 Spring plow-harrogator and cultipacker 1X, field cultivator and drag 1X, planted with the same planter

PLOT NO.		1	2
Tillage treatment		No-till	Spring plow
TOTAL VALUE		$370.32	$366.19
Seed, lime, misc.		$ 40.00	$ 40.00
Fertilizer:			
Broadcast 100# 0-0-60		6.90	6.90
Broadcast: (200# 0-0-60	$13.80		
(100# 0-44-0	12.35	26.15	26.15
Starter 230# 8-32-16		27.60	27.60
Nitrogen applied as 28-0-0		49.92	49.92
Foliar, 4 gallons 9-18-9		12.80	12.80
Chemicals:			
Herbicides		40.25	27.28
Insecticides		14.61	10.01
Interest: 7 months @ 12%		15.28	14.05
TOTAL VARIABLE COSTS		$233.51	$214.71
Machinery (custom rates)			
Primary tillage		$ -	$ 11.00
Secondary tillage		-	11.50
Planting		11.00	8.00
Cultivation		-	-
Spraying, spread fertilizer		16.00	13.00
Apply ammonia		-	-
Harvest		19.50	19.50
Trucking		12.62	12.60
TOTAL MACHINERY COSTS		$ 59.12	$ 75.60
TOTAL COSTS		$292.63	$290.31
RETURN TO LAND, MANAGEMENT		$ 77.69	$ 75.88
Time for tillage (minutes, estimated)		15	43
Diesel fuel for tillage (gallons, est.)		.75	3.60

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

Bill Reichert, Rt. 1, Attica, Ohio 44807 C14

PLOT DETAILS

Planted Pioneer 3518 in two plots on May 3 in 36-inch rows. Intended seed drop was 29,000 seeds of which 27,050 plants emerged in Plot #1 and 25,150 plants emerged in Plot #2. Soil present is Blount silt loam. Tile drainage is random in the lows. 1979 crop was conventional soybeans with a 16-inch rye cover crop established in Plot #1. 100# 0-0-60 was fall broadcasted. 200# 0-0-60 and 100# 0-44-0 were spring broadcasted. 230# 8-32-16 was applied next to the row. 208# N was applied as 28% and 4 gallons 9-18-9 was foliar sprayed in June for a total $N-P_2O_5-K_2O$ on both plots as follows: 230-126-221. Plot #1 received 1.1 qt. Paraquat CL with X-77 spreader at 16 oz./100 gallons 28% just after planting. Both plots received 1.7 qt. Aatrex 4L, 2.6 qt. Bladex 4L and 2.6 pt. Dual 8E just after planting using 70 gallons 28%/acre as carrier. Excellent grass and broadleaf weed control in both plots. 12# Furadan 10G was applied in the furrow and Isotox "D" seedtreater was used in both plots. Plot #1 was treated with 2 qt. Toxaphene 6E on June 17 for armyworm infestation. No other insect problems. Harvested October 22.

Bill Reichert found no-till corn to fit nicely with cropping system of corn, soybeans and wheat in field strips. Field checks after planting are a good way to observe reduced tillage crop response and to insure early detection of possible pest activity.

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

Niese Brothers, 7510 Cole Road, Crestline, Ohio 44827 C15

PLOT NO.	TILLAGE	CROP	FINAL STAND	MOIS-TURE	TEST WEIGHT	YIELD DRY/BU/AC	TOTAL VALUE	TOTAL COSTS	RETURN TO LAND, MGT.
1	Fall coult.chisel	Corn	24,350	23.9	53.0	128.9	$362.89	$294.86	$ 67.53
2	No-till	Corn	25,150	22.95	53.5	131.3	372.29	299.26	73.03

TILLAGE

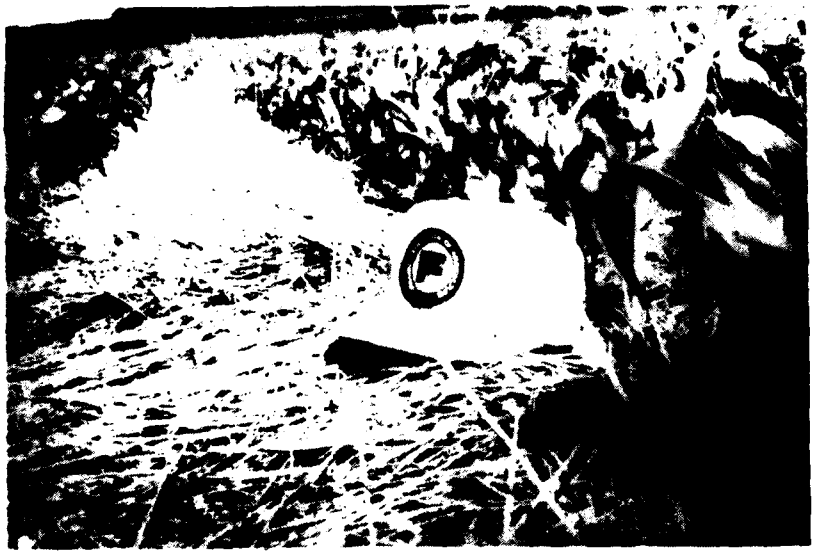
1 Fall coult.chisel-disc and cultipacker 1X, planted with John Deere 7000 conservation tillage planter
2 Planted with the same planter

PLOT NO.	1	2
Tillage treatment	Fall coultered chisel	No-till
TOTAL VALUE	$362.39	$372.29
Seed, lime, misc.	$ 40.00	$ 40.00
Fertilizer:		
Broadcast 600# 5-14-42	55.50	55.50
Broadcast 545# 33-0-0	47.69	47.69
Starter 13 gallons 10-34-0	22.24	22.24
Nitrogen applied as 28-0-0	-	17.93
Nitrogen incorporated as 28-0-0	14.25	-
Chemicals:		
Herbicides	25.99	33.55
Insecticides	11.18	11.18
Interest: 7 months @ 12%	15.18	15.97
TOTAL VARIABLE COSTS	$232.03	$244.06
Machinery (custom rates)		
Primary tillage	$ 8.25	$ -
Secondary tillage	5.50	-
Planting	8.00	11.00
Cultivation	-	-
Spraying, spread fertilizer	9.00	12.00
Apply ammonia	-	-
Harvest	19.50	19.50
Trucking	12.58	12.70
TOTAL MACHINERY COSTS	$ 62.83	$ 55.20
TOTAL COSTS	$294.86	$299.26
RETURN TO LAND, MANAGEMENT	$ 67.53	$ 73.03
Time for tillage (minutes, estimated)	33	15
Diesel fuel for tillage (gallons, estimated)	2.65	.75

Niese Brothers, 7510 Cole Road, Crestline, Ohio 44827 C15

PLOT DETAILS

Planted Pioneer 3518 in two plots on May 2 in 30-inch rows. Intended seed drop was 30,200 seeds of which 27,850 plants emerged in Plot #1 and 28,050 plants emerged in Plot #2. Soils present are Bennington, Cardington and Alexandria silt loams. Tile drainage is random. 1979 crop was wheat with a clover mixture seeded in both plots. 600# 5-14-42 was fall broadcasted. 545# 33-0-0 was spring broadcasted and 13 gallons 10-34-0 was applied next to the row. Plot #1 had 20 gallons 28% applied with incorporation while Plot #2 received 25 gallons 28% just after planting as herbicide carrier. Total N-P_2O_5-K_2O for Plot #1 was 285-136-252, and for Plot #2 was 300-136-252. Plot #1 received 3 qt. Sutan 6.7E and 2.25 qt. Bladex 4L incorporated. Plot #2 received 1 qt. Paraquat CL with X-77 spreader at 16 oz./100 gallons 28%, 2.25 pt. Dual 8E and 2.25 Bladex 4L. Both plots had a post emergent application of 8 oz. Banvel D. Excellent grass and broadleaf weed control in Plot #1. Problems with mechanical agitation left strips of weak herbicide application in Plot #2. Foxtails and fall panicum were not controlled in these areas. 13.5# Furadan 10G applied in the furrow and Isotox "D" seedtreater used in both plots. No insect problems. Both plots received some hail damage in August. Harvested October 14.



This is no-till corn after wheat, an excellent stand regardless of tillage system. In addition, wheat straw protects the soil from the erosive force of raindrop impact, thus reducing soil loss, not to mention loss of expensive fertilizers and herbicides.

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

Roger Marquart, 7858 McCarthy Road, New Washington, Ohio 44854 C16

PLOT NO.	TILLAGE	CROP	FINAL STAND	MOIS-TURE	TEST WEIGHT	YIELD DRY/BU/AC	TOTAL VALUE	TOTAL COSTS	RETURN TO LAND, MGT.
1	No-till /1	Corn	17,602	24.5	53.7	125.4	$351.60	$264.59	$ 87.01
2	Fall plow /1	Corn	20,988	22.1	55.6	149.7	426.76	275.28	151.48

TILLAGE

1 Planted with Allis Chalmers 600 no-till plate planter
2 Fall plow-field cultivation and drag 2X, planted with the same planter, row cultivated 1X

PLOT NO.	1	2
Tillage treatment	No-till	Fall plow
TOTAL VALUE	$351.60	$426.76
Seed, lime, misc.	$ 40.00	$ 40.00
Fertilizer:		
Broadcast: (110# 0-44-0 $13.59 (350# 0-0-60 24.15	37.74	37.74
Starter 200# 11-40-11+1s	29.30	29.30
Nitrogen applied as 28-0-0	54.24	54.24
Chemicals:		
Herbicides	31.16	13.53
Insecticides	9.23	9.23
Interest: 7 months @ 12%	14.12	12.88
TOTAL VARIABLE COSTS	$215.79	$196.92
Machinery (custom rate)		
Primary tillage	$ -	$ 11.00
Secondary tillage	-	12.00
Planting	11.00	8.00
Cultivation	-	4.50
Spraying, spread fertilizer	6.00	9.00
Apply ammonia	-	-
Harvest	19.50	19.50
Trucking	12.30	14.36
TOTAL MACHINERY COSTS	$ 48.80	$ 78.36
TOTAL COSTS	$264.59	$275.28
RETURN TO LAND, MANAGEMENT	$ 87.01	$151.48
Time for tillage (minutes, estimated)	15	56
Diesel fuel for tillage (gallons, estimated)	.75	4.19

/1 Stated is the average of final stands, moisture, test weights and yield in dry/bu/ac for 5 varieties in each of the two plots.

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

Rogert Marquart, 7858 McCarthy Road, New Washington, Ohio 44854 C16

PLOT DETAILS

Planted Pioneer varieties 3535, 3529, 3541, 3518, and 3780 in two plots on May 1 in 36-inch rows. Intended seed drop was 27,000 of which 20,490 plants emerged in Plot #1 and 23,285 plants emerged in Plot #2. When emergence counts were taken, rotted seed was found in the no-till corn due to extremely saturated conditions at the soil surface due to heavy rainfall after planting, in combination with the presence of a layer of straw mulch from mowing stubble and/or possibly planting too deep. Seeds were planted at a depth of 1-3/4" - 2" and should have been planted at 1-1/4". The lack of stand in the no-till plot resulted in decreased yield. Soils present are Tiro and Condit silt loams. Tile drainage is random. 1979 crop was wheat with a clover mixture seeded. 110# 0-44-0 and 350# 0-0-60 were fall broadcasted. 200# 11-40-11+1s were applied next to the row. 226# N were applied as 28% for a total N-P_2O_5-K_2O on both plots as follows: 248-128-232. Plot #1 received 1 qt. Paraquat CL with X-77 spreader at 16 oz./ 100 gallons 28%, 2.6 qt. Aatrex 4L and 2.6 pt. Dual 8E using 76 gallons/acre of 28% as carrier. It was also spot treated post emergence using 8 oz. Banvel D. Plot #2 received 2.25 pt. Dual 8E also using 76 gallons/acre of 28% as carrier, and a post emergence application of 8 oz. Banvel D. Excellent grass and broadleaf weed control in both plots. 11# Furadan 10G and Isotox "F" seedtreater were used in both plots. No insect problems. Harvested October 15.

Checking fields after planting for proper emergence, good weed control plus possible insect and disease problems is particularly important when learning to adapt new tillage practices to your farm.

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

Phil Dunn, 7500 East County Road 12, Bloomville, Ohio 44818 — C17

PLOT NO.	TILLAGE	CROP	FINAL STAND	MOIS-TURE	TEST WEIGHT	YIELD DRY/BU/AC	TOTAL VALUE	TOTAL COSTS	RETURN TO LAND, MGT.
1	No-till	Corn	23,400	21.5	56.0	143.5	$411.96	$268.21	$143.75
2	Spring plow	Corn	23,950	19.75	56.0	174.0	505.51	281.63	223.88

TILLAGE

1 Planted with John Deere 7000 conservation tillage planter
2 Spring plow-harrogator 1X, disc and cultipacker plus drag 1X, planted with the same planter, row cultivation 1X

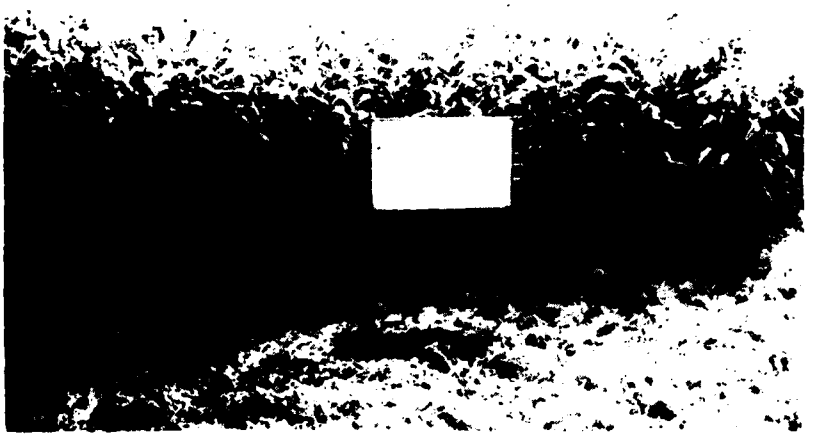
PLOT NO.	1	2
Tillage treatment	No-till	Spring plow
TOTAL VALUE	$411.96	$505.51
Seed, lime, misc.	$ 40.00	$ 40.00
Fertilizer:		
Broadcast 350# 6-15-40	33.25	33.25
Starter 33 gallons 9-27-3+2s	46.02	46.02
Nitrogen applied as 28-0-0	32.04	32.04
Chemicals:		
Herbicides	38.46	27.04
Insecticides	11.18	11.18
Interest: 7 months @ 12%	14.07	13.27
TOTAL VARIABLE COSTS	$215.02	$202.80
Machinery (custom rates)		
Primary tillage	$ -	$ 11.00
Secondary tillage	-	10.50
Planting	11.00	8.00
Cultivation	-	4.50
Spraying, spread fertilizer	9.00	9.00
Apply ammonia	-	-
Harvest	19.50	19.50
Trucking	13.69	16.33
TOTAL MACHINERY COSTS	$ 53.19	$ 78.83
TOTAL COSTS	$268.21	$281.63
RETURN TO LAND, MANAGEMENT	$143.75	$223.88
Time for tillage (minutes, estimated)	15	54
Diesel fuel for tillage (gallons, estimated)	.75	3.99

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

Phil Dunn, 7500 East County Road 12, Bloomville, Ohio 44818 C17

PLOT DETAILS

Planted Funks 4323 in two plots on May 1 in 30-inch rows. Intended seed drop was 30,200 of which 27,200 plants emerged in Plot #1 and 28,300 plants emerged in Plot #2. Soil present is Tiro silt loam. Tile drainage is random. 1979 crop was wheat with a clover mixture seeded. In both plots 350# 6-15-40 was fall broadcasted, 33 gallons 9-27-3+2s were applied next to the row, 40.4# N was applied as 28% in combination with 50 gallons water as herbicide carrier just after planting. 93.1# N was applied as 28% two weeks later for a total N-P_2O_5-K_2O in both plots as follows: 188-154-151. Plot #1 received 1 qt. Paraquat CL with X-77 spreader at 16 oz./100 gallons 28%, 1.6 qt. Aatrex 4L, 2.6 qt. Bladex 4L and 2.6 pt. Dual 8E. Plot #2 did not receive any Paraquat CL or X-77 spreader. Excellent grass and broadleaf weed control. Some scattered patches of quackgrass. Both plots received 13.5# Furadan 10G in the furrow and Isotox "D" seedtreater. No insect problems. Anthracnose stalk rot was present throughout the two plots and severe in places. Harvested October 13.



Planting to drop 10% extra seed in a no-till situation helps insure excellent final stands like this one. Slower planting speeds, 3-4 mph, and seed-soil contact further contribute to good stands.

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

John Jacoby, 6529 Connely Road, New Washington, Ohio 44854 C18

PLOT NO.	TILLAGE	CROP	FINAL STAND	MOIS-TURE	TEST WEIGHT	YIELD DRY/BU/AC	TOTAL VALUE	TOTAL COSTS	RETURN TO LAND, MGT.
1	No-till	Corn	16,150	18.6	57.5	110.9	$324.64	$242.95	$ 81.69
2	Fall plow	Corn	23,200	17.95	58.5	140.5	413.54	248.39	165.15

TILLAGE

1 Planted with John Deere 7000 conservation tillage planter
2 Fall plow-field cultivated and drag 2X, planted with the same planter

PLOT NO.	1	2
Tillage treatment	No-till	Fall plow
TOTAL VALUE	$324.64	$413.54
Seed, lime, misc.	$ 40.00	$ 40.00
Fertilizer:		
Broadcast: (100# 0-46-0 $12.35; (200# 0-0-60 13.80	26.15	26.15
Broadcast 100#0-0-60	6.90	6.90
Starter 213# 12-24-24	23.75	23.75
Nitrogen applied as 28-0-0	44.45	44.45
Chemicals:		
Herbicides	23.76	12.00
Insecticides	11.18	11.18
Rodenticide	4.33	-
Interest: 7 months @ 12%	12.64	11.51
TOTAL VARIABLE COSTS	$193.16	$175.94
Machinery (cuctom rates)		
Primary tillage	$ -	$ 11.00
Secondary tillage	-	12.00
Planting	11.00	8.00
Cultivation	-	-
Spraying, spread fertilizer	9.00	9.00
Apply ammonia	-	-
Harvest	19.50	19.50
Trucking	10.29	12.95
TOTAL MACHINERY COSTS	$ 49.79	$ 72.45
TOTAL COSTS	$242.95	$248.39
RETURN TO LAND, MANAGEMENT	$ 81.69	$165.15

Time for tillage (minutes, estimated)	15	45
Diesel fuel for tillage (gallons, estimated)	.75	3.80

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

John Jacoby, 6529 Connely Road, New Washington, Ohio 44854 C18

PLOT DETAILS

Planted Pioneer 3780 in two plots on May 3 in 30-inch rows. Intended seed drop was 27,700 seeds of which 16,350 plants emerged in Plot #1 and 23,650 plants emerged in Plot #2. Soil present is Blount silt loam. Tile drainage is very random. 1979 crop was wheat with a clover seeding not established due to heavy smothering of straw. The heavy straw was not fall rotary mowed which kept the soil wet and also gave mice a place to winter over, while also smothering out the clover. Plot #1 was rotary mowed in the spring to help disperse the straw so the no-till planter could work correctly, move and/or lower the mice population and help get the field dried out. The plots received heavy rain shortly after planting which led to lengthy saturated conditions and much rotten seed in Plot #1, emerged populations illustrate this. The layer of heavy, dead (non-growing) residue combined with imperfect subsurface and surface drainage was an apparent detriment in establishing an adequate plant stand in Plot #1. 100# 0-46-0 and 200# 0-0-60 were fall broadcasted. 100# 0-0-60 was spring broadcasted in both plots with a zinc phosphide treated mice bait at 10#/acre to insure mice control in Plot #1. 213# 12-24-24 was applied next to the row. 185.2# N was applied as 28% for a total N-P_2O_5-K_2O as follows: 211-97-231. Plot #1 received 1 qt. Paraquat CL with X-77 spreader at 16 oz./100 gallons 28%, 2# Princep 80W and 2# Bladex 80W just after planting using 62.4 gallons 28%/acre as carrier. The amount of residual herbicides applied in Plot #1 was lower than planned. Plot #2 received the same amount of residual herbicides with no Paraquat CL and X-77 spreader with the same carrier. Poor grass and good broadleaf weed control in Plot #1. Giant foxtail, nutsedge and barnyard grass present. Plot #2 had good grass and good broadleaf weed control. Some giant foxtail present. 13.5# Furadan 10G applied in the furrow and Isotox "D" seedtreater used in both plots. Some European corn borer present. No insect problems. No mice damage noticed. Harvested October 31.

Maurey Lewis, Honey Creek Project Technician, inspects sediment and runoff collection installation on the fall plow portion of the John Jacoby tillage demo, field. Following an early summer rain of about 2½", soil and phosphorus losses from the fall plow area were more than 10 times greater than the no-till area.

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

Herb Crum, 5108 South County Road 43, Tiffin, Ohio 44883 C19

PLOT NO.	TILLAGE	CROP	FINAL STAND	MOIS-TURE	TEST WEIGHT	YIELD DRY/BU/AC	TOTAL VALUE	TOTAL COSTS	RETURN TO LAND, MGT.
1	No-till	Corn	26,450	18.05	56.5	143.7	$422.58	$242.81	$179.77

TILLAGE

1 Planted with John Deere 7000 conservation tillage planter

PLOT NO.	1
Tillage treatment	No-till
TOTAL VALUE	$422.58
Seed, lime, misc.	$ 40.00
Fertilizer:	
Broadcast: (250# 0-0-60 $17.25; (100# 0-44-0 12.35	29.60
Starter 250# 9-29-19	32.50
Nitrogen applied as 28-0-0	35.86
Chemicals:	
Herbicides	31.28
Insecticides	11.18
Interest: 7 months @ 12%	12.63
TOTAL VARIABLE COSTS	$193.05
Machinery (custom rates)	
Primary tillage	$ -
Secondary tillage	-
Planting	11.00
Cultivation	-
Spraying, spread fertilizer	6.00
Apply ammonia	-
Harvest	19.50
Trucking	13.26
TOTAL MACHINERY COSTS	$ 49.76
TOTAL COSTS	$242.81
RETURN TO LAND, MANAGEMENT	$179.77

Time for tillage (minutes, estimated)	15
Diesel fuel for tillage (gallons, estimated)	.75

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

Herb Crum, 5108 South County Road 43, Tiffin, Ohio 44883 C19

PLOT DETAILS

Planted Pioneer 3780 on on April 27 in 30-inch rows. Intended seed drop was 29,900 of which 27,100 plants emerged in the Blount and Morley silt loam soils. No tile drainage present. 1979 crop was a sparse alfalfa sod. 250# 0-0-60 and 100# 0-46-0 were fall broadcasted. 250# 9-29-19 was applied next to the row. 149# N were applied as 28% for a total N-P_2O_5-K_2O as follows: 172-118-197. 1 qt. Paraquat CL with 16 oz. X-77 spreader per 100 gallons 28%, 2.5 qt. Aatrex 4L and 3.5 qt. Bladex 4L was applied using 50 gallons 28%/acre as carrier. Excellent grass and broadleaf weed control. Some nutsedge in the lowest part of the plot. 13.5# Furadan 10G was applied in the furrow and Isotox "D" seedtreater was used. No insect problems. Harvested October 21.

No-till corn after alfalfa is a good way to reduce some nitrogen input for corn production. Research has shown that the corn plant is able to use the nitrogen stored up in legumes under no-tillage just as efficiently as if it were plowed.

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

Ross Eckstein, 6521 Johnston Road, New Washington, Ohio 44854 S1

PLOT NO.	TILLAGE	CROP	FINAL STAND	MOIS-TURE	TEST WEIGHT	YIELD DRY/BU/AC	TOTAL VALUE	TOTAL COSTS	RETURN TO LAND, MGT.
1	No-till	Soybeans	146,000	11.8	56.5	45.6	$342.20	$164.04	$178.16
2	Spring plow	Soybeans	157,500	11.8	57.25	48.6	364.50	176.02	188.48

TILLAGE

1 Planted with Allis-Chalmers 333 no-till air planter, extra units on 15" spacing
2 Spring plow-harrogator, field cultivator with drag 2X, planted with same planter

PLOT NO.		1	2
Tillage treatment		No-till	Spring plow
TOTAL VALUE		$342.20	$364.50
Seed, lime, misc.		$ 40.00	$ 40.00
Fertilizer:			
Broadcast 200# 0-44-0	$24.90		
Broadcast 250# 0-0-60	17.25	41.95	41.95
Chemicals:			
Herbicides		30.55	19.43
Insecticides		.65	.65
Interest: 6 months @ 12%		6.79	6.12
TOTAL VARIABLE COSTS		$119.94	$108.15
Machinery (custom rates)			
Primary tillage		$ -	$ 11.00
Secondary tillage		-	17.00
Planting		16.50	12.00
Cultivation		-	-
Spraying, spread fertilizer		6.00	6.00
Apply ammonia		-	-
Harvest		17.50	17.50
Trucking		4.10	4.37
TOTAL MACHINERY COSTS		$ 44.10	$ 67.87
TOTAL COSTS		$164.04	$176.02
RETURN TO LAND, MANAGEMENT		$178.16	$188.48
Time for tillage (minutes, estimated)		30	61
Diesel fuel for tillage (gallons, estimated)		1.50	4.90

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

Ross Eckstein, 6521 Johnston Road, New Washington, Ohio 44854 S1

PLOT DETAILS

Planted Wayne soybeans in two plots on May 29 in 15" rows. Planting rate of 200,000 seeds (88#) of which 146,000 plants emerged in Plot #1 and 157,500 plants emerged in Plot #2. Soils present are Bennington and Cardington silt loam. No tile present. 1979 crop was reduced tillage corn. Lime at 3 ton/acre was broadcasted in the fall after previous crop was harvested as part of his normal liming program. 200# 0-44-0 and 250# 0-0-60 was broadcasted in the spring for a total N-P_2C_5-K_2O applied as follows: 0-88-150. 3 qt. Lasso 4E, 1.5# Lorox 50W was applied on both plots just after planting with Plot #1 receiving 1.5 pt. Paraquat CL with X-77 spreader at 8 oz./100 gallons water. 45 gallons water per acre was used as herbicide carrier on all plots. Excellent grass and broadleaf weed control. Isotox "F" seed treater was used at planting. No insect problems. Harvested October 7.

Old cornstalks not only reduce soil loss in these no-till soybeans (left) but also eliminate soil crusting after rainstorms on bare soil. Erosion losses in the conventional spring plow soybeans (right) was more than 5 times greater.

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

Donald Crum, 5473 New Haven Road, Shelby, Ohio 44875 S2

PLOT NO.	TILLAGE	CROP	FINAL STAND	MOIS-TURE	TEST WEIGHT	YIELD DRY/BU/AC	TOTAL VALUE	TOTAL COSTS	RETURN TO LAND, MGT.
1	No-till	Soybeans	146,000	12.0	57.0	53.4	$400.50	$150.66	$249.84

TILLAGE

1 Planted with Allis-Chalmers 333 no-till air planter, extra units on 15" spacing

PLOT NO.		1
Tillage treatment		No-till
TOTAL VALUE		$400.50
Seed, Lime, Misc.		$ 40.00
Fertilizer:		
Broadcast 100# 0-44-0	$12.35	
Broadcast 200# 0-0-60	13.80	36.15
Chemicals:		
Herbicides		28.90
Insecticides		-
Interest: 6 months @ 12%		6.30
TOTAL VARIABLE COSTS		$111.35
Machinery (custom rates)		
Primary tillage		$ -
Secondary tillage		-
Planting		11.00
Cultivation		-
Spraying, spread fertilizer		6.00
Apply ammonia		-
Harvest		17.50
Trucking		4.81
TOTAL MACHINERY COSTS		$ 39.31
TOTAL COSTS		$150.66
RETURN TO LAND, MANAGEMENT		$249.84

Time for tillage (minutes, estimated)	30
Diesel fuel for tillage (gallons, estimated)	1.50

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

Donald Crum, 5473 New Haven Road, Shelby, Ohio 44875 S2

PLOT DETAILS

Planted Voris 295 soybeans on May 23 in 15" rows. Planting rate of 176,000 seeds (83#) of which 148,800 plants emerged in the Pewamo silty clay loam and Bennington, Cardington silt loam soils. Tile drainage is random in lows. 1979 crop was no-till corn. Lime at 4 ton/acre was broadcasted in the fall after previous crop was harvested as part of the normal liming program. 100# 0-44-0 and 200# 0-0-60 was broadcasted in the spring for a total N-P_2O_5-K_2O applied as follows: 0-44-120. 1.5 pt. Paraquat CL with X-77 spreader at 8 oz./100 gallons water, 3 qt. Lasso 4E, 7/8 pt. Sencor 4L was applied just after planting using 50 gallons water per acre as carrier. Excellent grass and broadleaf weed control. No insect problems. Harvested October 10.

Effective weed control in corn is a prerequisite of good weed control in soybeans. These no-till beans after no-till corn demonstrate a good herbicide program with proper application of all materials.

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

Bill Smith, 10685 East Township Road 106, Attica, Ohio 44807 S3

PLOT NO.	TILLAGE	CROP	FINAL STAND	MOIS-TURE	TEST WEIGHT	YIELD DRY/BU/AC	TOTAL VALUE	TOTAL COSTS	RETURN TO LAND, MGT.
1	No-till	Soybeans	147,050	13.7	56.0	53.7	$401.82	$154.45	$247.37
2	Spring plow	Soybeans	174,240	13.7	56.0	43.1	322.38	161.24	161.14
3	No-till	Soybeans	165,180	11.6	57.5	53.3	399.75	154.21	245.54

TILLAGE

1 Planted Vickery with John Deere 7000 convention tillage planted, doubled back to get 15" rows
2 Spring plow-disc with harrogator and cultipacker 2X, planted Vickery with same planter
3 Planted Agripo 26 with same planter

PLOT NO.		1	2	3
Tillage treatment		No-till	Spring plow	No-till
TOTAL VALUE		$401.82	$322.38	$399.75
Seed, lime, misc.		$ 40.00	$ 40.00	$ 40.00
Fertilizer:				
Broadcast 150# 0-44-0	$18.53			
Broadcast 200# 0-0-60	13.80	32.33	32.33	32.33
Chemicals:				
Herbicides		30.89	21.88	30.89
Insecticides		-	-	-
Interest : 6 months @ 12%		6.19	5.65	6.19
TOTAL VARIABLE COSTS		$109.41	$ 99.86	$109.41
Machinery:				
Primary tillage		$ -	$ 11.00	$ -
Secondary tillage		-	11.00	-
Planting		16.50	12.00	16.50
Cultivation		-	-	-
Spraying, spread fertilizer		6.00	6.00	6.00
Apply ammonia		-	-	-
Harvest		17.50	17.50	17.50
Trucking		5.04	3.88	4.80
TOTAL MACHINERY COSTS		$ 45.04	$ 61.38	$ 44.80
TOTAL COSTS		$154.45	$161.24	$154.21
RETURN TO LAND,MANAGEMENT		$247.37	$161.14	245.54
Time for tillage (minutes, estimated)		30	55	30
Diesel fuel for tillage (gallons, est.)		1.50	4.45	1.50

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

Bill Smith, 10685 East Township Road 106, Attica, Ohio 44807 S3

PLOT DETAILS

Planted Vickery soybeans at a planting rate of 231,000 seeds (84#) in Plots #1 and #2 while Agripro 26 soybeans were planted in Plot #3 at a planting rate of 205,800 seeds (84#). All plots were planted on May 10 in 15" rows with the same planter. Emergence in the Blount silt loam was as follows: 147,050 plants emerged in Plot #1, 174,240 plants emerged in Plots #2 and 165,180 plants emerged in Plot #3. Tile drainage is systematic. 1979 crop was no-till corn in Plots #1 and #3, and conventional corn in Plot #2. 150# 0-44-0 and 200# 0-0-60 was broadcasted in the spring for a total N-P_2O_5-K_2O as follows: 0-66-120. 1.6 pt. Paraquat with X-77 spreader at 8 oz./100 gallons water, 2.5 pt. Dual 8E and 1 pt. Lexone 4L was applied just after planting using 50 gallons water per acre as carrier in the no-till plots. Plot #2 received no Paraquat. Good grass and excellent broadleaf weed control, a few giant foxtails present. Much volunteer corn in spring plowed Plot #2. No insect problems. Harvested Plots #1 and #2 on September 27, and Plot #3 on October 1.

No-till soybeans after no-till corn yielded 54 bu/ac for Bill Smith. Late summer moisture stress, volunteer corn and common ragweed seeminly led to reduced yields, 43 bu/ac, for conventional spring plow soybeans.

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

Gene Studer, 6309 Connely Road, New Washington, Ohio 44854 S4

PLOT NO.	TILLAGE	CROP	FINAL STAND	MOIS-TURE	TEST WEIGHT	YIELD DRY/BU/AC	TOTAL VALUE	TOTAL COSTS	RETURN TO LAND, MGT.
1	No-till	Soybeans	139,400	11.6	56.5	44.6	$334.50	$111.49	$223.01
2	Fall tandem disc	Soybeans	113,950	11.6	56.5	40.8	306.00	118.35	187.65
3	Fall plow	Soybeans	100,010	11.3	56.5	47.4	355.50	124.45	231.05

TILLAGE

1 Planted with John Deere 7000 conservation tillage planter, doubled back to make 15" rows
2 Fall tandem disc-spring tandem disc with cultipacker 2X, planter with same planter, rotary hoed 1X
3 Fall plow-spring tandem disc with cultipacker 2X, planted with same planter, rotary hoed 1X

PLOT NO.	1	2	3
Tillage treatment	No-till	Fall tandem disc	Fall plow
TOTAL VALUE	$334.50	$306.00	$355.50
Seed, lime, misc.	$ 40.00	$ 40.00	$ 40.00
Fertilizer	-	-	-
Chemicals:			
Herbicides	26.49	19.60	19.60
Insecticides	-	-	-
Interest: 6 months @ 12%	3.99	3.58	3.58
TOTAL VARIABLE COSTS	$ 70.48	$ 63.18	$ 63.18
Machinery (custom rates)			
Primary tillage	$ -	$ 5.50	$ 11.00
Secondary tillage	-	11.00	11.00
Planting	16.50	12.00	12.00
Cultivation	-	2.50	2.50
Spraying, spread fertilizer	3.00	3.00	3.00
Apply ammonia	-	-	-
Harvest	17.50	17.50	17.50
Trucking	4.01	3.67	4.27
TOTAL MACHINERY COSTS	$ 41.01	$ 55.17	$ 61.27
TOTAL COSTS	$111.49	$118.35	$124.45
RETURN TO LAND, MANAGEMENT	$223.01	$187.65	$231.05
Time for tillage (minutes, estimated)	30	50	61
Diesel fuel for tillage (gallons, est.)	1.50	3.50	4.70

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

Gene Studer, 6309 Connely Road, New Washington, Ohio 44854 S4

PLOT DETAILS

Planted Gries 315 soybeans in three plots on May 5 in 15-inch rows. Planting rate was 211,680 seeds (84#) in Plot #1, and 226,800 seeds in Plots #2 and #3; of which 139,400 plants emerged Plot #1, 113,950 plants emerged in Plot #2, and 100,010 plants emerged in Plot #3. Soils in the plots are Condit silty clay loam, Bennington silt loam and Cardington silt loam. Tile drainage is systematic. 1979 crop was conventional corn. No fertilizer or lime was applied because soil tests showed adequate nutrients. Plot #2 and Plot #3 had 2 pt. Dual 8E and 2# Lorox 50W applied at planting while Plot #1 had 1 pt. Paraquat CL with 8 oz. X-77 spreader/ 100 gal. water, 2½ pt. Dual 8E and 7/8 pt. Sencor 4L applied using 50 gallons of water per acre as carrier. Excellent grass and broadleaf weed control in Plot #1. Excellent grass and fair broadleaf weed control in Plots #2 and #3, common ragweed present. More volunteer corn in Plots #2 and #3. No insect problems. Harvested October 10.

A variety of fall tillage operations exist which aid seedbed preparation and at the same time retain sufficient quantities of crop residue to reduce erosion. Here Gene Studer compares fall discing (left) and fall plowing in corn before rotating to soybeans.

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

Jim Spitzer, P. O. Box 245, Bloomville, Ohio 44818 S5

PLOT NO.	TILLAGE	CROP	FINAL STAND	MOIS-TURE	TEST WEIGHT	YIELD DRY/BU/AC	TOTAL VALUE	TOTAL COSTS	RETURN TO LAND, MGT.
1	No-till	Soybeans	144,970	14.7	56.0	54.8	$408.76	$117.90	$290.86
2	Spring plow	Soybeans	128,240	14.8	55.5	52.1	388.62	119.82	268.80
3	Spring plow	Soybeans	129,660	15.0	55.5	49.9	372.20	115.62	256.58

TILLAGE

1 Planted with John Deere 7000 conservation tillage planter, doubled back to make 15" rows
2 Spring plow-fall flexible disc, disc with cultipacker 2X, planted with same planter
3 Spring plow-fall flexible disc, disc with cultipacker 2X, planted with a drill on 7" spacing

PLOT NO.	1	2	3
Tillage treatment	No-till	Spring plow	Spring plow
TOTAL VALUE	$408.76	$388.62	$372.20
Seed, lime, misc.	$ 40.00	$ 40.00	$ 40.00
Fertilizer	-	-	-
Chemicals:			
Herbicides	31.67	17.20	17.20
Insecticides	-	-	-
Interest: 6 months @ 12%	4.30	3.43	3.43
TOTAL VARIABLE COSTS	$ 75.97	$ 60.63	$ 60.63
Machinery (custom rates)			
Primary tillage	$ -	$ 11.00	$ 11.00
Secondary tillage	-	11.00	11.00
Planting	16.50	12.00	8.00
Cultivation	-	-	-
Spraying, spread fertilizer	3.00	3.00	3.00
Apply ammonia	17.50	17.50	17.50
Trucking	4.93	4.69	4.49
TOTAL MACHINERY COSTS	$ 41.93	$ 59.19	$ 54.99
TOTAL COSTS	$117.90	$119.82	$115.62
RETURN TO LAND, MANAGEMENT	$290.86	$268.80	$256.58
Time for tillage (minutes, estimated)	30	55	45
Diesel fuel for tillage (gallons, est.)	1.50	4.45	3.80

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

Jim Spitzer, P. O. Box 245, Bloomville, Ohio 44818 S5

PLOT DETAILS

Planted Agripro 26 soybeans on May 14 in Plots #1 and #2 in 15" rows, and in Plot #3 drilled in 7" rows. Planting rate was 205,800 seeds (84#) in Plots #1 and #2, and 200,900 seeds (82#) in Plot #3. Emergence was as follows: Plot #1 had 144,970 plants emerge, Plot #2 had 128,240 plants emerge, and Plot #3 had 129,660 plants emerge in the Gallman and Milton Variant loam soils. No tile drainage present. 1979 crop was conventional corn. No fertilizer or lime was applied because soil tests showed adequate nutrients. 2 pt. Dual 8E and 1½# Lorox 50W was applied on Plots #2 and #3 just after planting. Plot #1 had 1 qt. Paraquat CL with 8 oz. X-77 spreader/100 gallons water, 2.6 pt. Dual 8E and .8 pt. Lexone 4L applied just after planting using 50 gallons water per acre as carrier. Excellent grass and broadleaf weed control in all plots. No insect problems. Harvested October 5.

Farmers were able to evaluate a variety of conservation tillage practices during tours of demonstration fields. Here a tour group in June observes Jim Spitzer's no till soybeans after corn.

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

Tom Niese, 7552 Sawyer Road, Tiro, Ohio 44887 — S6

PLOT NO.	TILLAGE	CROP	FINAL STAND	MOIS-TURE	TEST WEIGHT	YIELD DRY/BU/AC	TOTAL VALUE	TOTAL COSTS	RETURN TO LAND, MGT.
1	No-till w/rye	Soybeans	160,730	13.3	56.0	49.5	$370.75	$181.56	$189.19
2	No-till w/rye	Soybeans	138,980	13.9	55.0	46.8	350.05	155.24	194.81

TILLAGE

1 Planted Callaham 9250 with Moore Uni-drill (no-till drill)
2 Planted Voris 295 with same drill

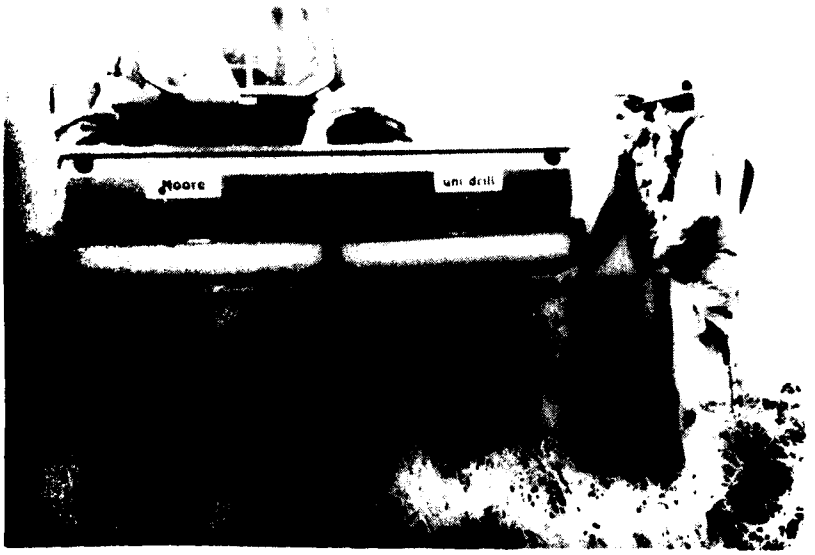
PLOT NO.	1	2
Tillage treatment	No-till	No-till
TOTAL VALUE	$370.75	$350.05
Seed, lime, misc.	$ 40.00	$ 40.00
Fertilizer:		
Broadcast 200# 7-20-34	21.50	21.50
Broadcast 100# 7-20-34+20mg	15.35	15.35
Chemicals:		
Herbicides	52.02	30.25
Insecticides	-	-
Interest: 6 months @ 12%	7.73	6.43
TOTAL VARIABLE COSTS	$136.60	$113.53
Machinery (custom rate)		
Primary tillage	$ -	$ -
Secondary tillage	-	-
Planting	11.00	11.00
Cultivation	-	-
Spraying, spread fertilizer	12.00	9.00
Apply ammonia	-	-
Harvest	17.50	17.50
Trucking	4.46	4.21
TOTAL MACHINERY COSTS	$ 44.96	$ 41.71
TOTAL COSTS	$181.56	$155.24
RETURN TO LAND MANAGEMENT	$189.19	$194.81
Time for tillage (minutes, estimated)	15	15
Diesel fuel for tillage (gallons, est.)	.75	.75

1980 TILLAGE COMPARISON CULTURAL & ECONOMIC DATA

Tom Niese, 7552 Sawyer Road, Tiro, Ohio 44887 S6

PLOT DETAILS

Planted Callahan 9250 soybeans in Plot #1 on May 15 in 6-5/8" rows, while Voris 295 was planted in Plot #2 on the same day with the same equipment. Planting rate was 219,600 seeds (90#) in Plot #1, and 190,800 seeds (90#) for Plot #2 of which 160,730 plants emerged in Plot #1 and 138,980 plants emerged in Plot #2. Soils present are Olmstead, Marengo silty clay loam soils, and Bennington, Cardington silt loams. Tile drainage is systematic. 1979 crop was conventional soybeans with a rye cover crop. 200# 7-20-34 was applied in the fall while 100# 7-20-34+20 manganese was applied in the spring for a total N-P_2O_5-K_2O on both plots as follows: 21-60-102. 2 qt. Roundup was applied on Plot #1 ten days before planting using 30 gallons water per acre as carrier with 3 qt. Lasso 4E and 3/4 pt. Sencor 4L applied just after planting. Plot#2 received 1 qt. Paraquat with 8 oz. X-77 spreader/100 gallons water, 3 qt. Lasso 4E and 3/4 pt. Sencor 4L just after planting using 30 gallons water per acre as carrier. The rye in Plot #1 was approximately 14" high at planting and dead while the rye in Plot #2 was approximately 28" high and growing at time of planting. Soybean plants in the taller rye tended to be leaning and lodged more than the short, but harvesting them was no problem. Excellent grass and broadleaf weed control in both plots. No insect problems. Harvested September 30.



Demonstrating different types of reduced tillage planters is an important part of the Honey Creek Project. After some testing, Tom Niese found his Moore Uni-Drill to work well for planting soybeans into a rye cover crop after soybeans.

No-till and Reduced Tillage Herbicide-Insecticide Results

Tables 9, 10 and 11 summarize the herbicide and insecticide treatments used on all no-till and reduced till plots for both corn and soybeans. The following are specific observations made involving herbicides:

1. Paraquat CL or Roundup (1 plot) was used in all no-till plots: Paraquat CL for quick burndown of existing vegetation and Roundup for a slower burndown, but more effective control and eradication of perennials such as quackgrass. In one of the reduced tillage corn plots a low rate of Paraquat CL was used to insure control of young germinated grasses and broadleafs without tillage.

2. Carrier for Roundup was 30 gallons of water (Tom Niese plot), while the carriers for Paraquat CL in soybean plots was 30 to 50 gallons of water. In corn plots the amount of carrier varies from 12.8 gallons 28% in combination with 53 gallons of water to 93 gallons of 28% N. In most cases, by using 28% N, an extra trip over the field was saved.

3. Grasses, especially nutsedge, foxtails and fall panicum, were the main weeds considered before residual herbicide recommendations were made. The previous year's herbicide, the possibility of plant injury from possible herbicide carryover, and the next year's planned crop were also considered.

4. Table 11 shows that the overall weed control in the no-till and reduced tillage (1 plot) soybean plots was excellent. Probably reasons for this include not skimping chemicals, especially Paraquat CL and grass herbicides, the use of plenty of carrier (at least 50 gallons of water) and high pressure for good penetration into and around residue. All plots were sprayed soon after planting.

5. Tables 9 and 10 show that the overall weed control in the no-till and reduced tillage corn plots was excellent. There were weed control problems in only 3 plots. Mechanical problems caused problems in the Nedolast plot because of a plugged spray nozzle and in the Niese Bros. plot because of insufficient mechanical agitation in the sprayer used. The weed control problem in the Jacoby plot stemmed from not getting enough active material on the plot. Because of a heavy straw residue, rates should have been higher to insure control in this plot.

6. Most corn and soybeans plots were sprayed by custom applicators using some type of floater equipment These results, as for 1979's tillage plots, show that custom applicators can do a very fine job in spraying for no-till and reduced tillage systems. By considering past problem weeds, types and rates of herbicides for these weeds, proper mixing and agitation of herbicides--especially use of a surfactant with Paraquat--and adequate (high) spray gallonages and pressures, recommendations can be made to insure excellent weed control using custom spray equipment. After the right chemicals, carriers, pressures, etc. are calculated, it's up to the driver to put it all to work.

7. Three-way residual corn herbicide combinations of Atrazine, Bladex, and (Lasso or Dual); or Atrazine, Princep and (Lasso or Dual); or Bladex, Princep and (Lasso or Dual); have been working very well in this area. Three-way mixes control a broader spectrum of weeds, for example, against fall panicum with the addition of Bladex or Princep in the standard combinations of Atrazine and (Lasto or dual). Three-ways can also provide the longlasting control of triazines without worrying about next year's carryover. By adding Bladex to suffice for the more longlasting Atrazine or Princep, carryover can be eliminated. Custom applicators also like the three-way combinations with Bladex because they can

be sure they are getting the proper overlap with the outside nozzles of their rigs without having to worry about next year's crop injury hazzard.

8. 2,4-D Amine and Banvel D were used in some corn plots for escape broadleafs and/or to take care of Canada thistle, milkweed, dogbane, etc. Post emergent chemicals can be used in no-till and reduced tillage corn and soybeans, if needed, just as they are used in traditional tillage methods. With better post emergent chemicals on the market having the capability to do many things, farmers do have good chemicals to fall back on if, for some reason, they need to.

Table 9 Reduced Tillage Herbicide-Insecticide Treatments (Corn)

Cooperator	Cover type	Materials /1	Rates/Acre	Costs/ Acre	Volume & Carrier /Acre	Remarks
Phenicie	Cornstalks	Paraquat CL	1 pt.	$26.94	65 gal. 28% N	Excellent weed control
		Princep 80W	2.5#			
		Dual 8E	2.5 pt.			
		Furadan 10G	13.5#	$10.53		No insect problems
Phenicie	Cornstalks	Princep 80W	2.5#	$20.50	65 gal. 28% N	Excellent weed control
		Dual 8E	2.5 pt.			
		Furadan 10G	13.5#	$10.53		No insect problems
Depinet	Cornstalks	Aatrex 4L	2 qt.	$17.25	65 gal. 28% N	Excellent weed control
		Dual 8E	2.5 pt.			Much volunteer corn
		Isotox"D" Sd. Trt.	5 oz/bu			
		Furadan 10G	13.6#	$11.25		No insect problems
Ziegler	Cornstalks	Aatrex 4L	1.5 qt.	$15.56	57.7 gal. 28% N	Excellent weed control
		Dual 8E	2.4 pt.			
		Isotox"D" Sd.Trt.	5 oz/bu			
		Furadan 10G	13.5#	$11.18		No insect problems
Kalb	Soybean stubble	Aatrex 4L	2.5 qt.	$18.17	40 gal. 28% N	Excellent weed control
		Lasso 4E	3 qt.			
		Isotox"D" Sd.Trt.	5 oz/bu			
		Furadan 10G	13.5#	$11.18		No insect problems
Geissman	Soybean stubble	Aatrex 4L	2 qt.	$17.25	65 gal. 28% N	Excellent weed control
		Dual 8E	2.5 pt.			
		Furadan 10G	13.5#	$10.53		Aphid infestation No other insect problems
Niese Bro.	Wheat with clover seeding	Bladex 4L	2.25 qt.	$25.99	20 gal. 28% N (incorporated)	Excellent weed control
		Sutan+ 6.7E	3 qt.			
		Banvel D	8 oz.(post)		20 gal. water	No insect problems

/1 A non-ionic surfactant such as X-77 spreader or Aquagene I was used with Paraquat CL to improve it's effectiveness. Rates are 2x the water rate when 28% N is used as herbicide carrier. Cost is included. This is an important management step in good vegetation burn down and residual weed control.

Table 10 No-till Herbicide-Insecticide Treatments (Corn)

Cooperator	Cover type	Materials /1	Rates/Acre	Costs/ Acre	Volume & Carrier /Acre	Remarks
Phenicie	No-till cornstalks	Paraquat CL	1 pt.	$26.94	65 gal. 28% N	Some giant foxtail and fall panicum
		Princep 80W	2.5#			
		Dual 8E	2.5 pt.			
		Furadan 10G	13.5#	$10.53		No insect problems
Phenicie	Cornstalks w/rye Cornstalks (2 plots)	Paraquat CL	1 pt.	$26.94	65 gal. 28% N	Excellent weed control in both plots
		Princep 80W	2.5#			
		Dual 8E	2.5 pt.			
		Furadan 10G	13.5#	$10.53		No insect problems
Nedolast	No-till cornstalks	Paraquat CL	1 qt.	$31.75	30 gal. 28% N	Some green foxtail present, Some spray skips caused by plugged spray nozzle.
		Princep 80W	2.5#			
		Dual 8E	2.5 pt.			
		Isotox"F" Sd.Trt.	4½ oz/bu	$ 3.24		
	(3 plots)	Dyfonate 20G	3/4 pt.			No insect problems
Price	No-till cornstalks	Paraquat CL	1.2 qt.	$39.36	12.8 gal 28% N with 53 gal. water	Excellent weed control
		Aatrex 4L	1.5 qt.			
		Bladex 4L	2.5 qt.			
		Dual 8E	2.4 pt.			
		Isotox"D" Sd.Trt.	5 oz/bu			
		Furadan 10G	13.5#	$11.18		No insect problems
Depinet	Cornstalks	Paraquat CL	1 pt.	$23.69	65 gal. 28% N	Excellent weed control
		Aatrex 4L	2 qt.			
		Dual 8E	2.5 pt.			
		Isotox"D" Sd.Trt.	5 oz/bu			
		Furadan 10G	13.6#	$11.25		No insect problems
Ziegler	Cornstalks	Paraquat CL	.8 pt.	$20.79	57.7 gal. 28% N	Excellent weed control
		Aatrex 4L	1.5 qt.			
		Dual 8E	2.4 pt.			
		Isotox"F" Sd.Trt.	4.5 oz/bu			
		Furadan 10G	13.5#	$11.18		No insect problems
D. Crum	No-till soybean stubble (small wheat cc)	Paraquat CL	1.5 pt.	$29.83	93 gal. 28% N	Excellent weed control
		Princep 80W	2.5#			
		Lasso 4E	3 qt.			
		Isotox"D" Sd.Trt.	5 oz/bu			
		Furadan 10G	11#	$ 9.23		No insect problems
Kalb	Soybean stubble with 12" rye	Paraquat CL	1 qt.	$29.57	40 gal. 28% N	Excellent weed control
		Aatrex 4L	2.5 qt.			
		Lasso 4E	3 qt.			
		Isotox"D" Sd.Trt.	5 oz/bu			Army worms above economic threshold, post treatment needed
		Furadan 10G	13.5#			
		Toxaphene 6E	2 qt.(post)	$15.78	30 gal. water	

Table 10 No-till Herbicide-Insecticide Treatments (Corn) (continued)

Cooperator	Cover type	Materials /1	Rates/Acre	Costs/ Acre	Volume & Carrier / Acre	Remarks
Kalb	Soybean stubble	Paraquat CL	1 qt.	$29.57	40 gal. 28% N	Excellent weed control
		Aatrex 4L	2.5 qt.			
		Lasso 4E	3 qt.			
		Isotox"D" Sd.Trt.	5 oz/bu			
		Furadan 10G	13.5#	$11.18		No insect problems
Fritz	Soybean stubble with 26" rye	Paraquat CL	1 qt.	#33.31	75 gal. 28% N	Excellent weed control in all plots
		Bladex 4L	1 qt.			
		Aatrex 4L	1.5 qt.			
		Dual 8E	2.75 pt.			
		Isotox"D" Sd.Trt.	5 oz/bu			Army worms above economic thresh-
		Furadan 10G	13.5#			old, post treatment needed
	(3 plots)	Toxaphene 6E	2 qt.(post)	$15.78	30 gal. water	
Geissman	Soybean stubble with 10" rye	Paraquat CL	1.5 pt.	$26.40	65 gal. 28% N	Excellent weed control
		Aatrex 4L	2 qt.			
		Dual 8E	2.5 pt.			
		Furadan 10G	13.5#			Armyworms above economic thresh-
		Toxaphene 6E	2 qt.(post)	$15.13	30 gal. water	old, post treatment needed
						Aphid infestation
Geissman	Soybean stubble	Paraquat CL	1.5 pt.	$26.40	65 gal. 28% N	Excellent weed control
		Aatrex 4L	2 qt.			
		Dual 8E	2.5 pt.			
		Furadan 10G	13.5#	$10.53		Aphid infestation
						No other insect problems
Allen	Soybean stubble with 15" rye	Paraquat CL	1 pt.	$26.70	52.4 gal. 28% N	Excellent weed control
		Aatrex 4L	1.5 qt.			
		Bladex 4L	1.5 qt.			
		Dual 8E	2.2 pt.			
		Isotox"F" Sd.Trt.	4.5 oz/bu			Armyworms above economic thresh-
		Furadan 10G	15#			old, post treatment needed
		Toxaphene 6E	2 qt.(post)	$16.95	30 gal. water	
R. Reichert	Soybean stubble with 11" rye	Paraquat CL	1 qt.	$32.42	70 gal. 28% N	Excellent weed control
		Aatrex 4L	1 qt.			
		Bladex 4L	1.5 qt.			
		Lasso 4E	3 qt.			
		Isotox"D" Sd.Trt.	5 oz/bu			
		Furadan 10G	12#			
		Toxaphene 6E	2 qt.(post)		30 gal. water	Armyworms above economic thresh-
		Toxaphene 6E	1.5 qt.(")	$18.06	30 gal. water	old,post treatment needed twice

/1 A non-ionic surfactant such as X-77 spreader or Aquagene I was used with Paraquat CL to improve it's effectiveness. Rates are 2x the water rate when 28% N is used as herbicide carrier. Cost is included. This is an important management step in good vegetation burn down and residual weed control.

Table 10 No-till Herbicide-Insecticide Treatments (corn) (continued)

Cooperator	Cover type	Materials /1	Rates/Acre	Costs/ Acre	Volume & Carrier /Acre	Remarks
Bumb	Soybean stubble with 5" wheat	Paraquat CL	1.5 pt.	$27.72	55 gal. 28% N	Excellent weed control. Some patches of milkweed and hemp dogbane
		Princep 4L	2 qt.			
		Dual 8E	2 pt.			
		Isotox"F" Sd.Trt.	4.5 oz/bu			
		Furadan 10G	13.5#	$11.18		No insect problems
B. Reichert	Soybean stubble with 16" rye	Paraquat CL	1.1 qt.	$40.25	70 gal. 28% N	Excellent weed control
		Aatrex 4L	1.7 qt.			
		Bladex 4L	2.6 qt.			
		Dual 8E	2.6 pt.			
		Isotox"D" Sd.Trt.	5 oz/bu			
		Furadan 10G	12#			
		Toxaphene 6E	2 qt.(post)	$14.61	30 gal. water	Armyworms above economic threshold, post treatment needed
Niese Bro.	Wheat with clover seeding	Paraquat CL	1 qt.	$33.55	25 gal. 28% N	Problems with proper agitation left strips of weak herbicide application. Foxtail and fall panicum in these strips
		Bladex 4L	2.25 qt.			
		Dual 8E	2.25 pt.			
		Banvel D	8 oz.(post)		20 gal. water	
		Isotox"D" Sd.Trt.	5 oz/bu			
		Furadan 10G	13.5#	$11.18		No insect problems
Marquart	Wheat with clover seeding	Paraquat CL	1 qt.	$31.16	76 gal. 28% N	Excellent weed control
		Aatrex 4L	2.6 qt.			
		Dual 8E	2.6 pt.			
		Isotox"D" Sd. Trt.	5 oz/bu			
		Furadan 10G	11#	$ 9.23		No insect problems
Dunn	Wheat with clover seeding	Paraquat CL	1 qt.	$38.46	13.6 gal. 28% N with 50 gal. water	Excellent weed control Some small patches of quackgrass
		Aatrex 4L	1.6 qt.			
		Bladex 4L	2.6 qt.			
		Dual 8E	2.6 pt.			
		Isotox"D" Sd.Trt.	5 oz/bu			
		Furadan 10G	13.5#	$11.18		No insect problems
Jacoby	Wheat straw (heavy)	Paraquat CL	1 qt.	$23.76	62.4 gal 28% N	Poor grass control: giant foxtail, nutsedge and barnyard grass. Lower than planned rates applied.
		Princep 80W	2#			
		Bladex 80W	2#			
		Isotox"D" Sd.Trt.	5 oz/bu			
		Furadan 10G	13.5#	$11.18		No insect problems
		Mice bait (zinc phosphide coated cracked grains)	10#	$ 4.33		No mice damage

/1A non-ionic surfactant such as X-77 spreader or Aquagene I was used with Paraquat CL to improve it's effectiveness. Rates are 2x the water rate when 28% N is used as herbicide carrier. Cost is included. This is an important management step in good vegetation burn down and residual weed control.

Table 10 No-till Herbicide-Insecticide Treatments (Corn) (cont.)

Cooperator	Cover type	Materials /1	Rates/Acre	Costs/ Acre	Volume & Carrier /Acre	Remarks
H. Crum	Alfalfa sod	Paraquat CL	1 qt.	$31.28	50 gal. 28% N	Excellent weed control
		Aatrex 4L	2.5 qt.			Some nutsedge in lowest part of plot.
		Bladex 4L	3.5 qt.			
		Isotox"F" Sd.Trt.	4.5 oz/bu			
		Furadan 10G	13.5#	$11.18		No insect problems

/1 A non-ionic surfactant such as X-77 spreader or Aquagene I was used with Paraquat CL to improve it's effectiveness. Rates are 2x the water rate when 28% N is used as herbicide carrier. Cost is included. This is an important management step in good vegetation burn down and residual weed control.

Floyd Reinnart, Crawford County Agricultural Stabilization and Conservation Service office manager looks on while Don Phenicie dumps another yield check in the weigh wagon. Support from existing agricultural agencies has helped complement the demonstration effort.

Table 11 No-Till and Reduced Tillage Herbicide Treatments (Soybeans)

Cooperator	Cover type	Materials /1	Rates/Acre	Costs/ Acre	Volume & Carrier /Acre	Remarks
Eckstein	Cornstalks	Paraquat CL Lasso 4E Lorox 50W Isotox"F" Sd.Trt.	1 qt. 3 qt. 1.5# 4.5 oz/bu	$30.55 $ 0.65	45 gal. water	Excellent weed control
D. Crum	No-till cornstalks	Paraquat CL Lasso 4E Lexone 4L	1.5 pt. 3 qt. 7/8 pt.	$28.90	50 gal. water	Excellent weed control
Smith	No-till cornstalks (2 plots)	Paraquat CL Dual 8E Lexone 4L	1.6 pt. 2.5 pt. 1 pt.	$30.89	50 gal. water	Excellent weed control A very few giant foxtails
Studer	Cornstalks	Paraquat CL Dual 8E Sencor 4L	1 pt. 2.5 pt. 7/8 pt.	$26.49	50 gal. water	Excellent weed control A very few common ragweeds
Studer	Cornstalks (Reduced tillage plot)	Dual 8E Lorox 50W	2 pt. 2#	$19.60	20 gal. water	Excellent grass control Fair control of common ragweeds
Spitzer	Cornstalks	Paraquat CL Dual 8E Lexone 4L	1 qt. 2.6 pt. .8 pt.	$31.67	50 gal. water	Excellent weed control
T. Niese	Soybean stubble with 14" rye	Roundup Lasso 4E Sencor 4L	2 qt. 3 qt. 3/4 pt.	$52.02	30 gal. water	Excellent weed control Roundup used for quackgrass
T. Niese	Soybean stubble with 28" rye	Paraquat CL Lasso 4E Sencor 4L	1 qt. 3 qt. 3/4 pt.	$30.25	30 gal. water	Excellent weed control

/1 A non-ionic surfactant such as X-77 spreader or Aquagene I was used with Paraquat CL to improve it's effectiveness. Cost is included. This is an important management step in good vegetation burn down and residual weed control.

Universal Soil Loss Equation

$$A = R \times K \times LS \times C \times P$$

A - computed soil loss in tons per acre per year
R - erosion potential of rainfall
K - soil erodibility factor for a specific soil type
LS - slope length and slope steepness factor
C - cropping-management factor (vegetative cover, crop rotations, tillage practices, residue management)
P - erosion control practices (contour tillage, strip cropping)

These factors permit calculation of soil loss in tons per acre per year that might be expected over a long period of time. Calculated losses may then be compared to permissible soil loss values for different soils. Permissible losses are the maximum rate of erosion tolerable without loss of long term soil productivity. Tolerence factors for soils within demonstration plots are as follows:

Soil	Tolerance Factor (T/Ac/Yr)
Bennington	3
Blount	3
Cardington	5
Gallman	5
Lenawee	4
Tiro	4

Soil Loss Calculations

For all demonstration plots, soil losses (erosion) were calculated using the Universal Soil Loss Equation (see facing page). Factors in the equation are soil type, normal rainfall amount and intensity, soil erodibility, slope length, slope steepness and conservation practices (reduced tillage, cross-slope farming, etc.). Soil erodibility data was based on predominant soil types in the 5-15 acre plots. Slope length and steepness were measured in the field and amounts of surface residue were estimated shortly after planting. In soil loss calculations all residue were converted to corn residue equivalent: i.e., 500# soybean, small grain, or sod residue equals approximately 1000# corn residue.

Erosion control is directly and most significantly related to the amount of residue maintained on the soil surface. The two major factors in this calculation are (1) type and amount of residue, and (2) the percentage of residue left on the soil surface by tillage practices. Without at least 1000# corn residue equivalent per acre on the surface, soil erosion is not reduced significantly. Calculations were made assuming the following amounts of residue produced per acre: 100 bu. corn produces approximately 5600#; 50 bu. soybeans produces approximately 2500#; 45 bu. wheat produces approximately 4500#; a 12-inch clover plowdown mixture produces approximately 1000# residue per acre; and a 30-inch rye or wheat cover crop produces approximately 1800#. The amount of residue left on the surface after 30% winter loss is directly related to the type of tillage tools used, and the depth at which they are used. For example, the amount of residue incorporated below the surface for some different tillage operations are as follows:

Tillage Operation	% Incorporated Below Soil Surface /1
Moldboard plow	100%
Chisel (shanks spaced 12-15")	
A. Straight shovel points (7" deep)	30 - 50%
B. Twisted shovel points (7" deep)	50 - 70%
Coultered chisel (6-7" deep)	60 - 70%
Tandem or offset disc	
(6-7" deep)	60 - 70%
(4-5" deep)	40 - 50%
(3-4" deep)	30 - 40%
Field cultivator w/sweeps (4-5" deep)	30%

/1 Based on the Soil Conservation Service "Technical Guide," and field experience.

Table 12 Demonstration Plot Soil Loss Predictions

Cooperator	Phenicie		Phenicie				
Soil Type /1	Cardington SiLo		Bennington SiLo				
Allowed "T" Soil Loss Ton/Ac/Yr /2	5.0		3.0				
Crop Rotation /3	Cont. Corn		Cont. Corn				
1980 Crop	Corn		Corn				
Slope Length	150'		150'				
Slope	4%		2.5%				
Plot # /4	1	2*	1	2	3	4	5
Tillage /5	No-till	S. Plow	No-till	F. Plow	No-till	Reduced	Reduced
Residue Type	Corn W/Rye	-	Corn W/Rye	-	Corn	Corn	Corn
Estimated # Surface Residue Just After Plant /6	5600	0	5400	0	5200	2900	1600
Estimated Surface Cover Just After Plant	56%	0	50%	0	42%	33%	22%
Average Annual Est. Soil Loss Ton/Ac/Yr	1.6	8.2	1.1	6.3	1.1	3.0	3.6
Reduction Over Compared Plow System	81%	-	83%	-	83%	52%	43%

Cooperator	Crum		Kalb				Fritz	
Soil Type	Cardington SiLo		Bennington SiLo				Bennington SiLo	
Allowed "T" Soil Loss Ton/Ac/Yr	5.0		3.0				3.0	
Crop Rotation	CSb		CSb				CSb	
1980 Crop	Corn		Corn				Corn	
Slope Length	180'		200'				160'	
Slope	4.5%		3%				2.5%	
Plot #	1	2*	1	2	3	4	1	2
Tillage	No-till	S. Plow	No-till	No-till	Reduced	F. Plow	No-till	S. Plow
Residue Type	Soybean /Wheat	-	Soybean /Rye	Soybean	Soybean	-	Soybean /Rye	-
Estimated # Surface Residue Just After Plant	1700	0	1920	1200	<300	0	2960	0
Est. Surface Cover Just After Plant	40%	0	65%	19%	<5%	0	75%	0
Average Annual Est. Soil Loss Ton/Ac/Yr	3.8	10.5	2.3	3.8	6.6	6.6	1.1	6.0
Reduction Over Compared Plow System	64%	-	65%	42%	0%	-	82%	-

/1 Predominent soil type of 5-15 acre plots. Si = silt, Lo = loam, Cl = clay.
/2 T = tolerable soil loss in ton/ac/yr for a certain soil type.
/3 In many no-till situations cover crops may be in the rotation; i.e., Sbx, C = corn, Sb = soybeans, W = wheat, M = meadow, x = cover crop, i.e., rye, wheat, clover.

Table 12 Demonstration Plot Soil Loss Predictions

Nedolast		Price		Depinet			Ziegler		
Lewanee SiClLo		Tiro SiLo		Blount SiLo			Tiro SiLo		
4.0		4.0		3.0			4.0		
CCSbWx		Cont. Corn		Cont. Corn			Cont. Corn		
Corn		Corn		Corn			Corn		
700'		250'		180'			250'		
.3%		3%		4%			1%		
1	2	1	2*	1	2	3*	1	2	3
No-till	F. Plow	No-till	S. Plow	No-till	Reduced	F. Plow	No-till	S. Plow	Reduced
Corn W/Rye	-	Corn W/Rye	-	Corn	Corn	-	Corn	Corn	Corn
5200	0	7000	0	4200	1900	0	3300	0	875
55%	0	80%	0	58%	31%	0	58%	0	19%
.27	1.4	.49	6.6	1.9	6.0	9.7	1.2	3.3	3.3
81%	-	93%	-	80%	38%	-	64%	-	0%

Geissman Farms				Allen		R. Reichert		Bumb	
Tiro SiLo				Tiro SiLo		Blount SiLo		Gallman Lo	
4.0				4.0		3.0		3.0	
CSb				CSb		CSb		CSb	
Corn				Corn		Corn		Corn	
180'				160'		300'		200'	
2%				3%		5%		2%	
1	2	3	4	1	2	1	2	1	2
No-till	No-till	Reduced	S. Plow	No-till	S. Plow	No-till	S. Plow	No-till	S. Plow
Soybean W/Rye	Soybean	Soybean	-	Soybean W/Rye	-	Soybean W/Rye	-	Soybean W/Rye	-
1920	1200	600	0	2300	0	2000	0	1400	0
52%	20%	5%	0	52%	0	42%	0	35%	0
1.5	2.3	3.5	5.3	1.0	5.6	3.2	9.0	2.0	4.0
72%	57%	34%	-	82%	-	64%	-	50%	-

/4 Plots with asterisks mean no field trial exists. Situation is used to compare differences in tillage and estimated soil loss.

/5 S. plow = spring plow, F. plow = fall plow, Reduced = any tillage method between no-till and plowing.

/6 Some plots had residue left from cropping two years ago, estimated amount included.

Table 12 Demonstration Plot Soil Loss Predictions (continued)

Cooperator	B. Reichert		Niese Bros.			Marquart	
Soil Type	Blount SiLo		Cardington SiLo			Tiro SiLo	
Allowed "T" Soil Loss Ton/Ac/Yr	3.0		5.0			4.0	
Crop Rotation	CSb		CSbWx			CSbWx	
1980 Crop	Corn		Corn			Corn	
Slope Length	200'		250'			250'	
Slope	4%		4%			1%	
Plot #	1	2	1	2	3*	1	2
Tillage	No-till	S. Plow	No-till	Reduced	F. Plow	No-till	F. Plow
Residue Type	Soybean W/Rye	-	Wheat/ Clover	Wheat/ Clover	-	Wheat/ Clover	-
Estimated # Surface Residue Just After Plant	2160	0	2750	<400	0	4200	0
Estimated Surface Cover Just After Plant	45%	0	91%	<10%	0	98%	0
Average Annual Est. Soil Loss Ton/Ac/Yr	2.0	10.1	1.5	6.6	6.6	.30	1.9
Reduction Over Compared Plow System	80%	-	77%	0%	-	84%	-

Cooperator	D. Crum		Smith		Studer		
Soil Type	Bennington SiLo		Blount SiLo		Bennington SiLo		
Allowed "T" Soil Loss Ton/Ac/Yr	3.0		3.0		3.0		
Crop Rotation	CSb		CSb		CSb		
1980 Crop	Soybeans		Soybeans		Soybeans		
Slope Length	180'		200'		180'		
Slope	2.5%		2.5%		4.0%		
Plot #	1	2*	1	2	1	2	3
Tillage	No-till	S. Plow	No-till	S. Plow	No-till	Reduced	F. Plow
Residue Type	Corn	-	Corn	-	Corn	Corn	-
Estimated # Surface Residue Just After Plant	5900	0	3850	0	5100	<700	0
Estimated Surface Cover Just After Plant	66%	0	59%	0	54%	14%	0
Average Annual Est. Soil Loss Ton/Ac/Yr	1.0	6.0	2.1	5.9	1.9	10.0	10.4
Reduction Over Compared Plow System	83%	-	64%	-	82%	4%	-

Table 12 Demonstration Plot Soil Loss Predictions (continued)

Dunn		Jacoby		H. Crum		Eckstein	
Tiro SiLo		Blount SiLo		Blount SiLo		Bennington SiLo	
4.0		3.0		3.0		3.0	
CSbWx		CSbWx		CCSbWMMM		CSb	
Corn		Corn		Corn		Soybeans	
250'		225'		180'		250'	
2%		3%		4.5%		4%	
1	2	1	2	1	2*	1	2
No-till	S. Plow	No-till	F. Plow	No-till	S. Plow	No-till	S. Plow
Wheat/ Clover	-	Wheat	-	Alfalfa	-	Corn	-
4800	0	2800	0	850	0	5300	0
95%	0	96%	0	35%	0	51%	0
.51	3.1	.96	5.1	1.6	3.3	2.2	12.0
84%	-	81%	-	52%	-	80%	-

Spitzer		T. Niese	
Gallman Lo		Bennington SiLo	
5.0		3.0	
CSb		SbSbW	
Soybeans		Soybeans	
400'		250'	
1%		1.5%	
1	2	1	2*
No-till	S. Plow	No-till	F. Plow
Corn	-	Soybean /Rye	-
4100	0	2300	0
59%	0	62%	0
.60	3.0	0.6	2.7
80%	-	78%	-

Summary - Conclusions

1. For a second year, reduced and no-tillage practices were successfully demonstrated.

2. Economics of reduced and no-tillage systems appear favorable after a second year of observation, particularly for soybeans. Large yield decreases in several no-till corn plots severely hurt average yield and average return to land and management.

For corn, return to land and management, for 27 no-till demonstrations ranged from a low of -$9.94 per acre to a high of $143.94 per acre and averaged $83.79 per acre. Return to land and management for 7 reduced tillage demonstrations ranged from $18.60 to $191.01 per acre and averaged $79.94 per acre. Thirteen conventional demonstrations ranged from $55.02 to $223.88 per acre and averaged $133.86.

For soybeans, return to land and management for 8 no-till demonstrations ranged from $189.19 to $290.86 per acre and averaged $227.35 per acre. One reduced tillage demonstration was $187.65 per acre and for 5 conventional demonstrations from $161.14 to $268.80 per acre with an average of $221.21.

3. Erosion reductions with reduced and no-tillage practices can be very significant, especially for no-till. From USLE calculations (not measurements) done for 28 no-till plots, 27 showed soil loss reductions of 50% or more while 16 showed reductions of 80% or more. Reductions averaged 74%. For 8 reduced tillage plots, 2 showed soil loss reductions of 40% or more, 3 showed reductions of 4%, 34%, and 38%, respectively, while 3 showed no reductions. Reductions averaged 21%. Calculated soil losses for conventional plots or systems averaged 6.1 T/Ac/Yr.

4. Time and fuel savings can also be significant for reduced and no-tillage systems. Per acre calculations for no-till corn plots show a time savings of 32 minutes and a diesel fuel savings of 2.9 gallons/acre over conventional tillage plots. For reduced tillage corn, 15 minutes and 1.4 gallons/acre were saved. Time and fuel usage for conventional plots were 48 minutes and 3.8 gallons/acre. Similar data were found for soybean plots.

5. Results in the last two years show that one important factor to consider is weather conditions before and after nitrogen application in no-till corn production, especially when using urea and 28% nitrogen solutions. In the case of excessively wet or dry periods before or soon after application, a second application of nitrogen, applied later in the season to make up the loss, may be needed to reach full yield potential.

6. Application of proper management steps, i.e., planter calibrations, seed planting depth, proper herbicide and insecticide program selections, is the key to successful reduced and no-tillage operations. Demonstration of good crop stands with good weed control was again an important factor in spreading program acceptance during this second year. Other factors that influence the response to tillage are: soil type, soil fertility, function of living (cover crop) or dead crop residues, and especially natural, surface and subsurface drainage.

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Farmers, landowners, agri-business and agency people can work together to demonstrate and implement conservation practices for the improvement of water quality!